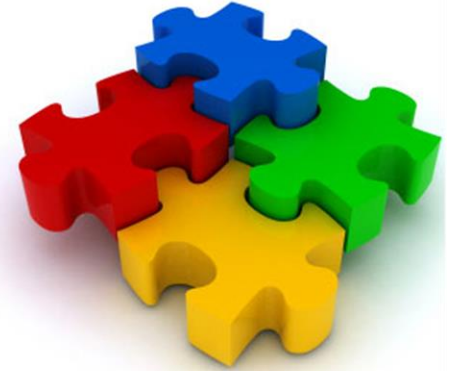

Decision Protocol for Cyanobacteria in B.C. Drinking & Recreational Water



Rupert Benzon, Land Use Manager
Ministry of Health (Health Protection Branch)



Presentation Synopsis



- Brief Overview of Cyanobacteria
- Why a Provincial Protocol – Relevance to Onsite?
- Protocol Sections/Highlights of Protocol



What are Cyanobacteria?



- Also known as Blue-Green Algae -- 3.5 billion years old
- Prokaryotic Microscopic Organisms
- 1st organism to give off O₂ (photosynthesis) – important in evolution of life.
- Ubiquitous --found in marine sediments and freshwater lakes
- Can live in extreme environments
- Nitrogen fixation
- Aerobic and anaerobic
- aquatic cyano can form blooms and produce toxins (microcystins).



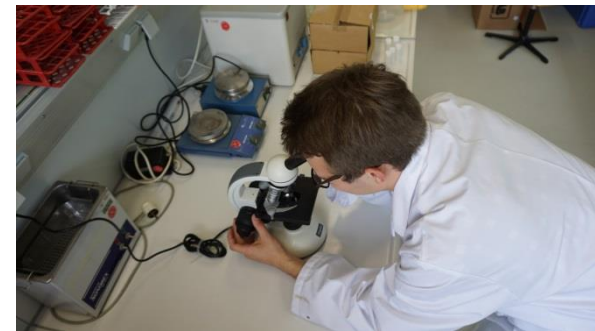
Why a Provincial Document?

- Consistent approach among regulators
- Varied conditions across province
- Streamlined version of Health Canada Document
- Health Authority/Industry Resource



Provincial Document

- Ground-truthed for 2 years → Updates
- Cyano Review Team:
 - 5 Health Authorities
 - Subject Matter Experts (NCCEH, ENV)
 - Local Government
 - First Nations Health Authority



Protocol Highlights

- Background
- Guidance Strategies
 - Watershed Info
 - Sampling (benefits/limitations, kits, responsibilities)
 - Communication
- Drinking Water and Recreational Water Decision Trees
- Appendices



Highlight 1



- Background regarding persistence of cyanoblooms
 - ❑ Microcystin toxin levels independent of biomass
 - ❑ Toxin persistence after cyanobloom no longer visible
 - ❑ Measure total microcystin due to large number of variants

Highlight 2



■ Sampling programs

- ❑ Bloom persistence
- ❑ Duration, location, frequency, and site history
- ❑ Decision Trees
- ❑ Benefits/Limitations of sampling



Highlight 3



■ Watershed Information

- ❑ Previous bloom events, nutrient loading (P,N)
- ❑ Ministry of Environment & Climate Change Strategy website
- ❑ Long term planning



Highlight 4

- Stakeholder roles and responsibilities
 - Determine prior to bloom events
 - Division of labour/resources
 - Communication among agencies



Highlight 5



- Community resources and Communication with the public
 - ❑ Local Governments, water system operators, Health Officers, community groups/Industry Associations -- contingency planning
 - ❑ Operational decisions
 - ❑ Coordinated messaging

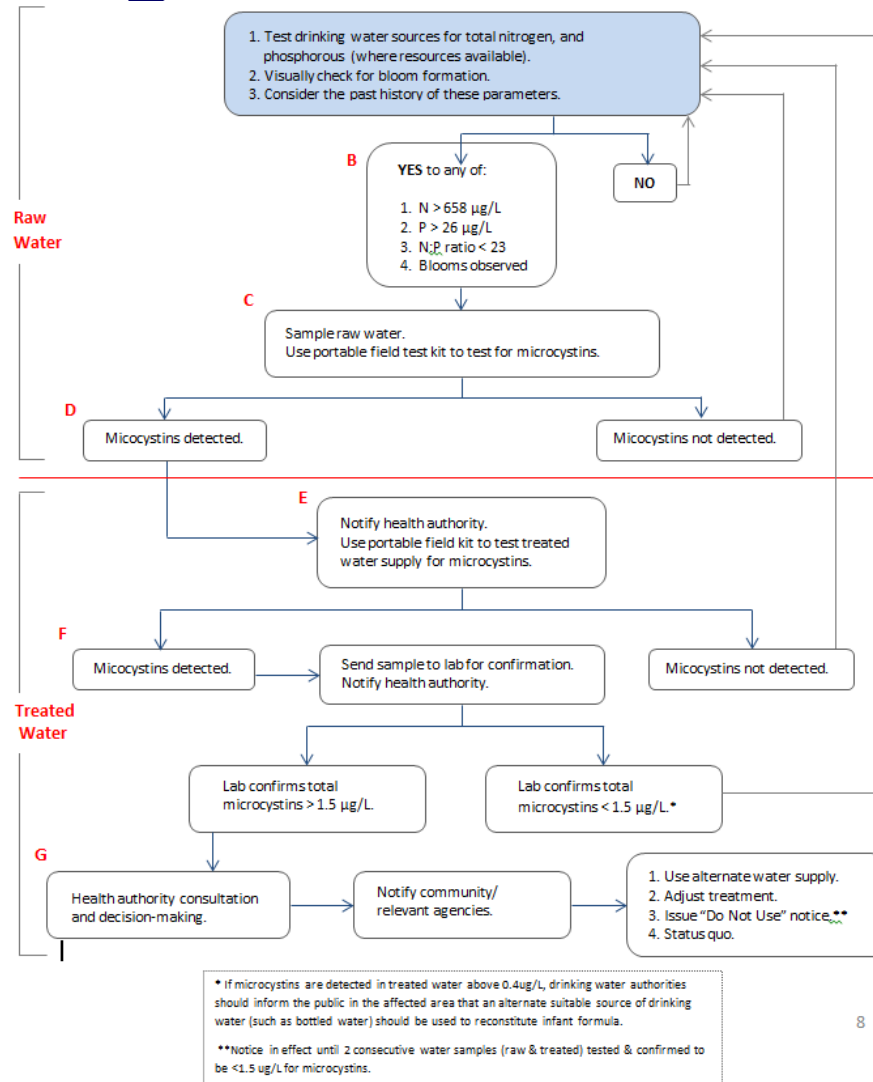


Highlight 6

- Drinking Water and Recreational Water Sampling Decision Trees

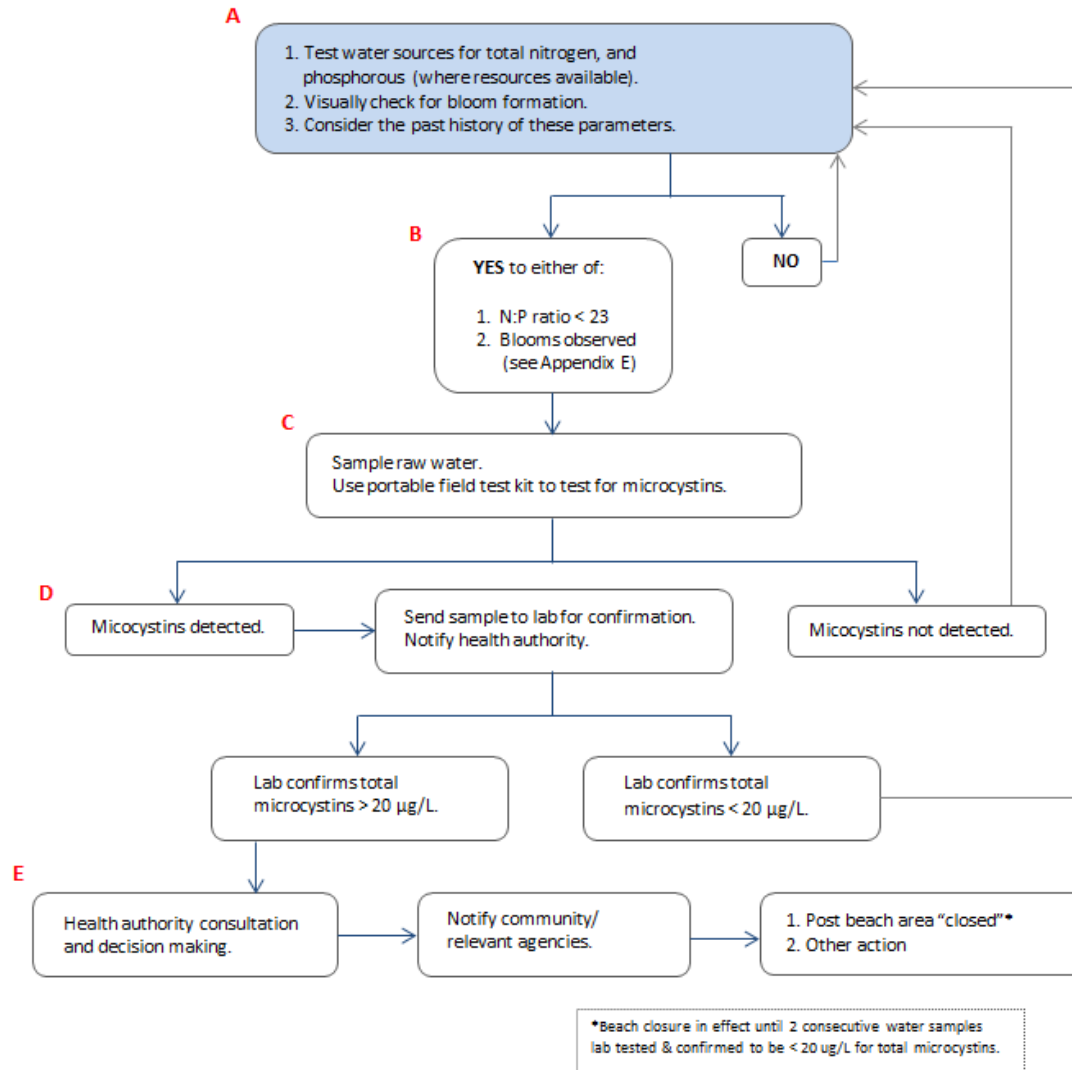


Drinking Water Decision Tree



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Recreational Water Decision Tree



Highlight 7



- Appendices including:
 - ❑ A provincial lakes network
 - ❑ Tools for algae identification and testing
 - ❑ Information on actions/decisions for cyanobacteria affecting water systems
 - ❑ Agency contacts for reporting bloom events
 - ❑ Acknowledgements



Tools for Algae Identification and Testing

- Field Tests (Jar, Stick)
- P/A Field Test Kits
- EnvironmentalComplaints@gov.bc.ca or RAPP
line 1-877-952-7277



Green Algae



Blue-Green Algae



Cyanobacteria Affecting Water Systems – Actions/Decisions

- Move intake
- Alternate water supply during cyano blooms
 - Differentiate from algal blooms
- Testing to ensure treatment system removing toxins
- Flowchart for unregulated water systems



Example scenarios for Cyano Occurrence – Recommended Water Uses and Treatment

Scenario	Total Microcystins (µg/L)	Recommended Use for Water	Treatment Objective	Example Processes	Comments
No recent bloom, no evidence of cyanobacteria in lake, or isolated bloom far from intake	< 1.5	Potable	Pathogen control (43210)	Pre-filtration + Microfiltration + {Chlorination, UltraViolet, Reverse Osmosis, or Boiling}	Base case disinfection
Bloom close to intake or 1 to 3 months post-bloom*	Possibly > 1.5	Potable	Pathogen control (43210) + cyanotoxin removal	As above, but add: Activated Carbon and/or Reverse Osmosis	Check filters and replace or backwash frequently for signs of algae. Replace activated carbon frequently.
		Non-potable**	Reduction of suspended solids and turbidity	Pre-filtration + Optional Chlorination	Check filter and replace or backwash frequently for signs of algae. Optional chlorination may reduce skin irritation.
Intake in algae bloom*	Possibly >> 1.5	Non-potable**	Reduction of algae mass	Bypass potable filtration systems. Pre-filtration + Optional Chlorination	Algae will overwhelm and clog filtration system. Optional chlorination may reduce skin irritation.

* If possible, move intake to deeper water (>4m deep) after bloom has passed.

** Use alternate source of potable water (eg bottled).

Agency Contacts for Reporting Bloom Events



- Health Authority Offices
- Ministry of Environment and Climate Change Strategy (Environmental Protection)



Acknowledgements

National Collaborating Centre for Environmental Health: Aroha Miller

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Island Health Authority: Heather Florence, Rory Beise

Ministry of Environment & Climate Change Strategy: Cindy Meays, Deb Epps

First Nations Health Authority: Alec Johnson

North Salt Spring Waterworks District: Meghan McKee





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Website for Provincial Protocol:

https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/waterquality/how-drinking-water-is-protected-in-bc/cyanobacteria_decision_protocol_2018.pdf

