

# DRINKING WATER SOURCE PROTECTION

Trent Conservation Coalition Source Protection Region



## 10 Surface Water Sites – Drinking Water Issues

Trent Conservation Coalition (TCC)

Source Protection Region (SPR)

Source Protection Committee Meeting – October 6, 2009

Peterborough, Ontario



**Expert People. Better Decisions.**



# Agenda



- § Technical Rules – latest version August 2009
- § Definition of Issues
- § Methodology of Identification
- § Surface Water Sites – Issues
- § Questions

# Technical Rules



- § Part XI – Drinking Water Threats: Water Quality
- § Part XI.1 – Describing drinking water issues
- § Rule 114 (Issues Definition)
- § Rule 115 (Required Information about Issue)
- § Rule 116 (Plan to obtain info if not available)
- § Rule 117 (Inclusion of info if source outside SPA)

# Issues Definition (Rule 114 (1))



- § Presence of parameter at intake or well (including monitoring well) for DWS listed in TOR, if parameter is listed in Schedule 1, 2 or 3 of the ODWQS or Table 4 of the TSD for ODWSOG, and
- Parameter is present at concentration that results in deterioration of water quality for use as source of drinking water, or
  - There is a trend of increasing concentrations and a continuation of that trend would result in deterioration of water quality for use as source of drinking water.

# Rule 114 (2)



§ Presence of pathogen at intake or monitoring well for DWS listed in TOR, if microbial risk assessment indicates that

- Pathogen is present at concentration that results in deterioration of water quality for use as source of drinking water, or
- There is a trend of increasing concentrations and a continuation of that trend would result in deterioration of water quality for use as source of drinking water.

# Rule 114 (3)



§ Widespread presence of parameter at intake or well for DWS not listed in TOR, if parameter is listed in Schedule 2 or 3 of the ODWQS or Table 4 of the TSD for ODWSOG, and

- Parameter is present at concentration that results in deterioration of water quality for use as source of drinking water, or
- There is a trend of increasing concentrations and a continuation of that trend would result in deterioration of water quality for use as source of drinking water.

# Rule 115



§ Information about Issues from anthropogenic causes to include:

- Parameter or pathogen concerned
- Where it occurred (intake, well, monitoring well, etc.)
- Area within vulnerable area where threats may contribute to parameter or pathogen
- Identification of which threats contribute or may contribute to the parameter or pathogen of concern.

# Methodology



- § Assemble water quality data.
- § Review all water quality data as per Rule 114 (Primary Benchmark).
- § Evaluate drinking water issues using qualitative approach (Secondary Benchmark - trends).
- § Operator Consultations
- § For anthropogenic issues, identify Issue Contributing Area within the vulnerable area.
- § List drinking water issues, according to Rule 115.

# Operator Consultation



- § Identify and interview Operating Authority and senior operational staff
- § Obtain background information: MOE Inspection Reports, CofA, Annual Reports
- § Provide preliminary list of Issues
- § Treatment technology
- § Opportunity for Operator comments
- § Problems with any issues

# Surface Water Sites



§ Lakefield

§ Peterborough

§ Hastings

§ Marmora

§ Campbellford

§ Warkworth

§ Frankford

§ Batawa

§ Trenton

§ Bayside



# Lakefield



## § Data reviewed

- Annual Reports 2006-2007
- Laboratory Certificates of Analysis: 2003
- WTP Water Quality: 2003-2006
- MOE Inspection Reports: 2000, 2002-2008
- MOE Laboratory Analysis: 2003
- PWQMN Station – Clear Lake Outlet (1966-2007)
- PWQMN Station – Otonabee River, Lock 25 (1972-2007)

# Lakefield – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, lead, DOC, hardness, manganese, temperature, turbidity (raw)
- NDMA (treated)

## § Secondary Benchmark Considerations – trend check

- Aldicarb, benzo(a)pyrene, THMs, selenium (treated)
- Nitrite, aluminum, iron, sodium, (raw & treated water)

# Lakefield – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- 5% (23/499) are >1000cfu/100ml

## § E.coli (naturally occurring & anthropogenic – micro)

- ICA – IPZ-1, 2 - Wildlife, agriculture, septics
- 3% (19/627) are >100cfu/100ml ; 1% (7/627) are >200cfu/100ml

## § NDMA - N-Nitrosodimethylamine (anthropogenic – chemical)

- 6 samples taken in April 2003, raw(2)-no exceed, treated(4)-50% exceed.
- antioxidant, additive for lubricants, softener of copolymers, been detected in some foods (smoked) and in treated river/lake water in heavily farmed locations. NDMA is an animal carcinogen.
- ICA – IPZ-1, 2, 3 – Agriculture, food processing

# Lakefield – Identified Issues (cont'd)



- § DOC, temperature, turbidity (naturally occurring – aesthetic)
- § Hardness (naturally occurring – operational)

# Peterborough



## § Data reviewed

- Annual Reports: 2005-2007
- MOE Inspection Reports: 2004-2008
- MOE Lab Data: 2002-2008
- WTP Water Quality: 2003–2006
- PWQMN Station – Otonabee River, Nassau Mills Rd:  
1965-2007

# Peterborough – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, cadmium, chromium, lead, aluminum, colour, DOC, hardness, iron, manganese, sodium, temperature, turbidity (raw water)
- NDMA (treated)

## § Secondary Benchmark Considerations- trend check

- Aldicarb, benzo(a)pyrene, fluoride, selenium, chloride (raw & treated)
- THMs (treated water)

# Peterborough – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- 2% (17/1056) are >1000cfu/100ml

## § E.coli (naturally occurring & anthropogenic – micro)

- 3% (30/1069) are >100cfu/100ml; 1% (11/1069) are >200cfu/100ml
- ICA – IPZ-1, 2 - Wildlife, agriculture, septics

## § NDMA - N-Nitrosodimethylamine (anthropogenic – chemical)

- ICA – IPZ-1, 2, 3 – Agriculture, food processing
- 5 treated samples taken in April 2003 - 60% exceed. 13 raw samples – no exceedances
- antioxidant, additive for lubricants, softener of copolymers, been detected in some foods (smoked) and in treated river/lake water in heavily farmed locations. NDMA is an animal carcinogen.

# Peterborough – Identified Issues (cont'd)



- § Colour, DOC, temperature, turbidity (naturally occurring – aesthetic)
- § Hardness (naturally occurring – operational)

# Hastings



## § Data reviewed

- Annual Reports 2004-2008
- MOE Inspection Reports 2000-2005, 2007-2009
- MOE Laboratory Data 1992, 1994 – 1996, 2002, 2003, 2007
- Laboratory Data 1996-2000
- WTP Water Quality 2003-2006
- PWQMN Station – Trent River: Bridge at Hastings: 1965-2007

# Hastings – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, colour, hardness, manganese, temperature, turbidity (raw water)
- DOC (treated water)

## § Secondary Benchmark Considerations - trend check

- Benzo(a)pyrene, selenium, THMs (treated water)
- lead, aluminum, iron (raw & treated)

# Hastings – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- 5% (17/318) >1000 cfu/100ml

## § E.coli (naturally occurring & anthropogenic – micro)

- 5% (18/399) >100 cfu/100ml; 2% (8/399) > 200 cfu/100ml
- ICA – IPZ-1, 2 - Wildlife, agriculture, septics

## § Colour, DOC, manganese, temperature, turbidity (naturally occurring - aesthetic)

- DOC: 2 raw – no exceed, 5 out 7 treated exceeded

## § Hardness (naturally occurring – operational)

# Marmora



## § Data reviewed

- Annual Reports: 2006-2008
- MOE Inspection Reports: 2000-2006, 2008
- WTP Water Quality: 2003-2006
- PWQMN Station – Crowe River: Hwy 7 at Marmora: 1964-1998

# Marmora – Preliminary Review



## § Primary Benchmark Exceedances:

- Total coliforms, E.coli, arsenic, lead, mercury, aluminum, colour, copper, DOC, hardness, iron, manganese, temperature, turbidity (raw water)
- THMs (treated water)

## § Secondary Benchmark Considerations – trend check

- chloride (raw water)
- cadmium, chromium, nitrite, sodium (raw & treated water)
- Aldicarb, benzon(a)pyrene, selenium, (treated water)

# Marmora – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- 2% (8/326) >1000 cfu/100ml

## § E.coli (naturally occurring & anthropogenic – micro)

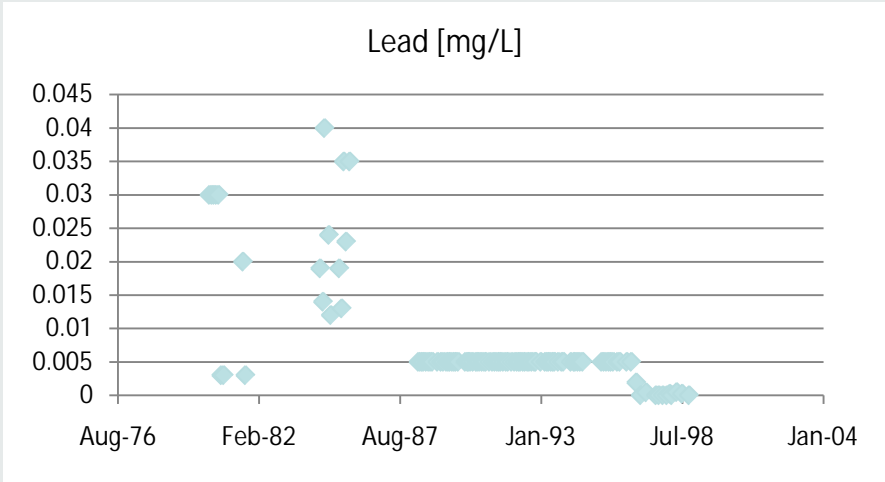
- 1% (4/268) >100 cfu/100ml; 0% > 200 cfu/100ml
- ICA – IPZ-1, 2 - Wildlife, agriculture, septics

## § Colour, iron, manganese, temperature, turbidity (naturally occurring - aesthetic)

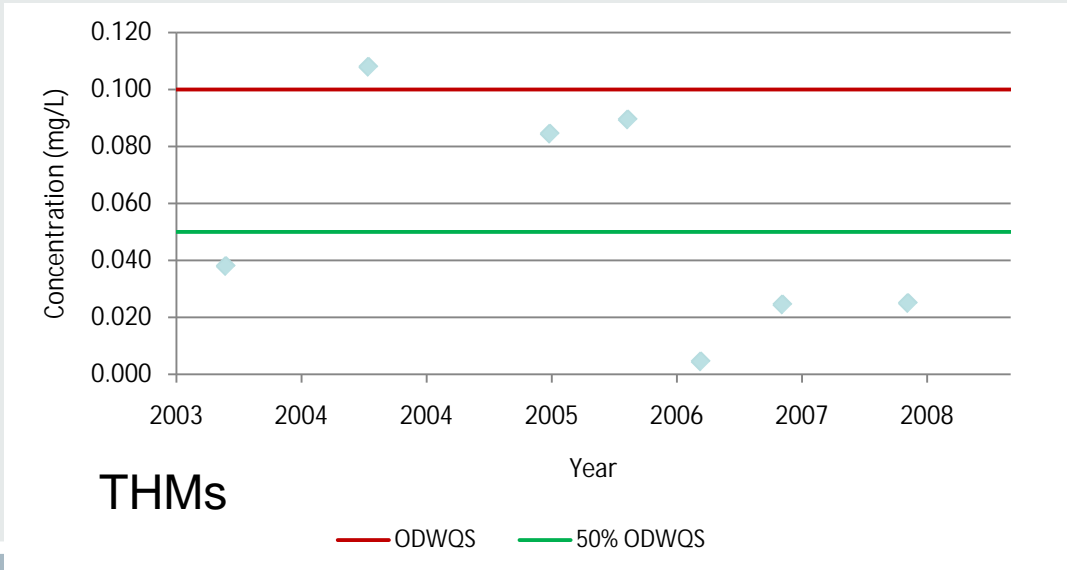
## § Hardness (naturally occurring – operational)



# Marmora Issues (cont'd)



## All PWQMN Data



# Campbellford

## § Data reviewed

- Annual Reports: 2004-2008
- MOE Inspection Reports: 2000-2002, 2004-2008
- MOE Laboratory Data: 2000, 2003
- PWQMN Station – Trent River at Dam in Campbellford: 1964-1998



# Campbellford – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, lead, alkalinity, aluminum, hardness, iron, manganese, temperature, turbidity (raw water)

## § Secondary Benchmark Considerations – trend check

- Aldicarb, benzo(a)pyrene, selenium, THMs (treated water)
- Arsenic, sodium (raw & treated water)
- Copper (raw water)

# Campbellford – Identified Issues



- § Total Coliforms (naturally occurring – microbiological)
  - 27% (52/190) >1000 cfu/100ml
- § E.coli (naturally occurring & anthropogenic – micro)
  - 6% (13/229) >100 cfu/100ml; 4% (9/229) > 200 cfu/100ml
  - ICA – IPZ-1, 2 - Wildlife, agriculture, septics
- § Colour, iron, manganese, temperature, turbidity (naturally occurring - aesthetic)
- § Aluminum, hardness (naturally occurring – operational)

# Warkworth

## § Data reviewed

- Annual Reports: 2004-2008
- MOE Inspection Reports: 1995, 1996, 2001, 2002, 2004, 2005, 2007
- MOE Laboratory Data: 2000, 2003, 2007
- Laboratory Certificates of Analysis: 2000
- WTP Data: 2000, 2003-2006
- PWQMN Station – Mill Creek: 2002-2007



# Warkworth – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, lead, manganese, pH, turbidity (raw water)
- aluminum (treated water)

## § Secondary Benchmark Considerations (>MDL)

- Iron, sodium (raw & treated)
- Aldicarb, benzo(a)pyrene, selenium (treated water)

# Warkworth – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- 29% (76/263) >1000 cfu/100ml

## § E.coli (naturally occurring & anthropogenic – micro)

- 30% (79/263) >100 cfu/100ml; 16% (41/263) > 200 cfu/100ml
- ICA – IPZ-1, 2 - Wildlife, agriculture, septic

## § pH (naturally occurring – operational)

# Frankford



## § Data reviewed

- Annual Reports: 2001, 2006-2008
- MOE Inspection Reports: 2000-2003, 2005-2008
- WTP Data: 2003-2006
- PWQMN Station – Trent River at Glen Ross: 1980-2006

# Frankford – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, cadmium, chromium, colour, hardness, iron, pH, temperature, turbidity (raw water)

## § Secondary Benchmark Considerations – trend check

- Aluminum, manganese, sodium (raw & treated)
- Benzo(a)pyrene, THMs, selenium (treated water)

# Frankford – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- 2% (3/125) >1000 cfu/100ml

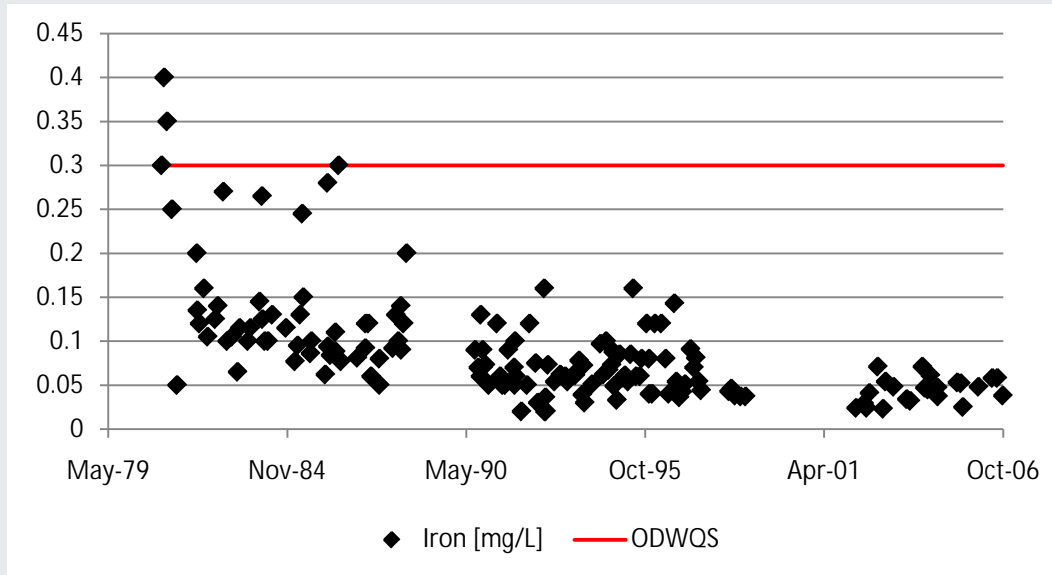
## § E.coli (naturally occurring & anthropogenic – micro)

- 1% (1/174) >100 cfu/100ml; 1% (1/174) > 200 cfu/100ml
- ICA – IPZ-1, 2 - Wildlife, agriculture, septics

## § Colour, temperature, turbidity (naturally occurring – aesthetic)

## § Hardness, pH (naturally occurring – operational)

# Frankford – Identified Issues



# Batawa



## § Data reviewed

- Annual Reports: 2006-2008
- MOE Inspection Reports: 2002 – 2006, 2008

# Batawa – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli (raw water)
- THMs (treated water)

## § Secondary Benchmark Considerations – trend check

- Aldicarb, benzo(a)pyrene, selenium, aluminum, sodium (treated water)
- Turbidity (raw & treated water)

# Batawa – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- Max 1760 cfu/100ml

## § E.coli (naturally occurring & anthropogenic – micro)

- Max 1100 cfu/100ml
- ICA – IPZ-1, 2 - Wildlife, agriculture, septics

# Trenton



## § Data reviewed

- Annual Reports: 2006-2008
- MOE Inspection Reports: 2000, 2003, 2004, 2005, 2006, 2008
- DWSP Data: 1990-2005
- WTP Data: 2003-2006
- PWQMN Station – Trent River at Hwy 401 Bridge

# Trenton – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, antimony, lead, alkalinity, aluminum, DOC, hardness, iron, manganese, temperature, turbidity (raw water)

## § Secondary Benchmark Considerations – trend check

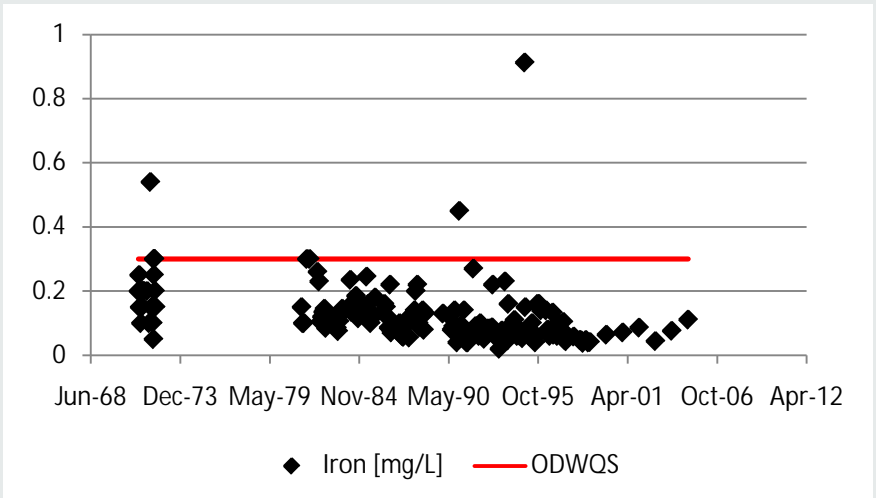
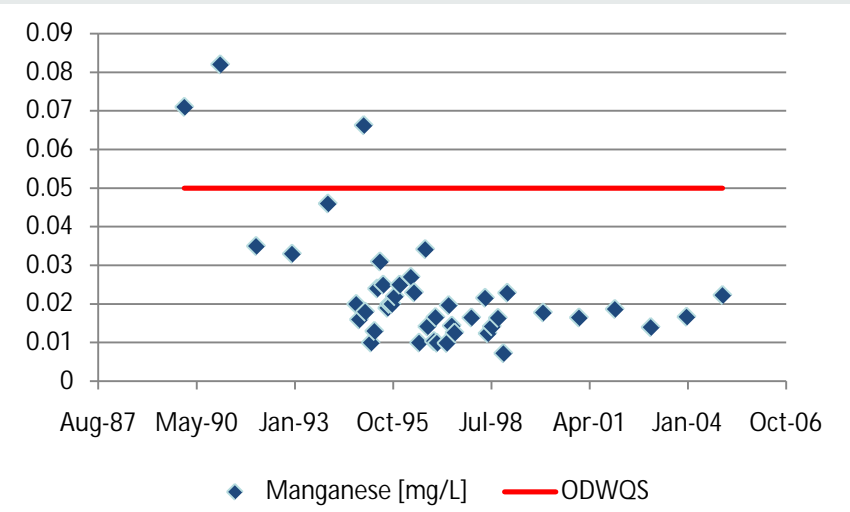
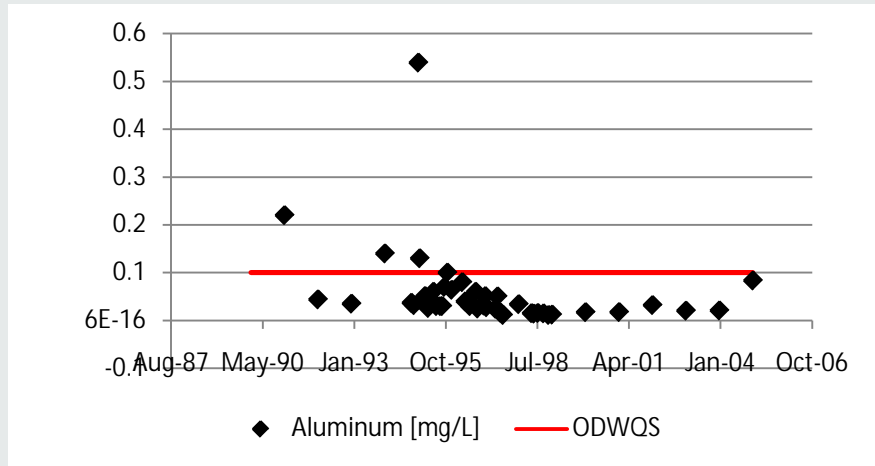
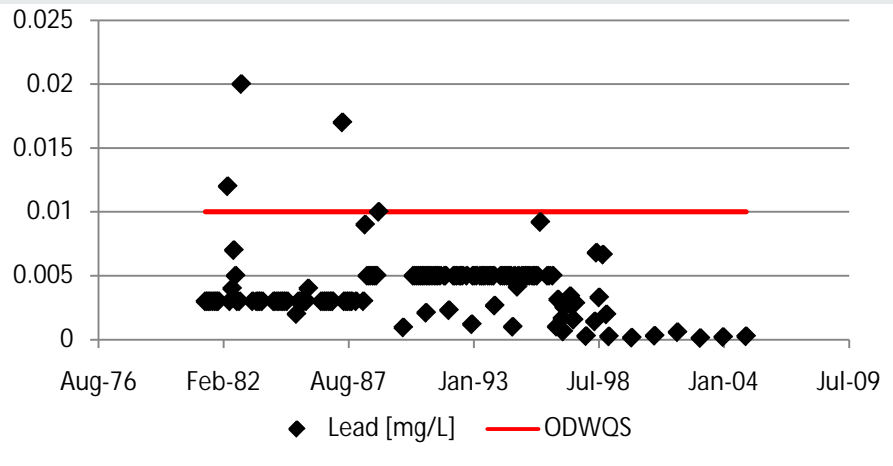
- Aldicarb, antimony, benzo(a)pyrene, chromium, fluoride, selenium, sodium (raw & treated)

# Trenton – Identified Issues



- § Total Coliforms (naturally occurring – microbiological)
  - 11% (16/144) >1000 cfu/100ml
- § E.coli (naturally occurring & anthropogenic – micro)
  - 3% (5/197) >100 cfu/100ml; 1% (2/197) > 200 cfu/100ml
  - ICA – IPZ-1, 2 - Wildlife, agriculture, septics
- § DOC, iron, temperature, turbidity (naturally occurring – aesthetic)
- § Aluminum, hardness (naturally occurring – operational)
- § Sodium (naturally occurring & anthropogenic – health) – increasing trend (> 20mg/L in 50 yrs)

# Trenton – Identified Issues



# Bayside



## § Data reviewed

- Annual Reports: 2006-2008
- OCWA Reports: 2000, 2001
- MOE Inspection Reports: 2001-2003, 2006, 2008
- DWSP Data: 1990-2005
- DWSP Special Data: 2002-2008
- GLISN Data: 1997, 2000, 2003

# Bayside – Preliminary Review



## § Primary Benchmark Exceedances:

- Total Coliforms, E.coli, microcystin-LR, colour, DOC, hardness, manganese, pH, temperature, turbidity (raw water)
- Uranium, aluminum (treated water)

## § Secondary Benchmark Considerations – trend check

- Benzo(a)pyrene, THMs (treated water)
- Aldicarb, chromium, fluoride, lead, mercury, selenium, iron, TDS (raw & treated water)

# Bayside – Identified Issues



## § Total Coliforms (naturally occurring – microbiological)

- Max 620 cfu/100ml

## § E.coli (naturally occurring & anthropogenic – micro)

- Max 36 cfu/100ml
- ICA – IPZ-1, 2 - Wildlife, agriculture, septics

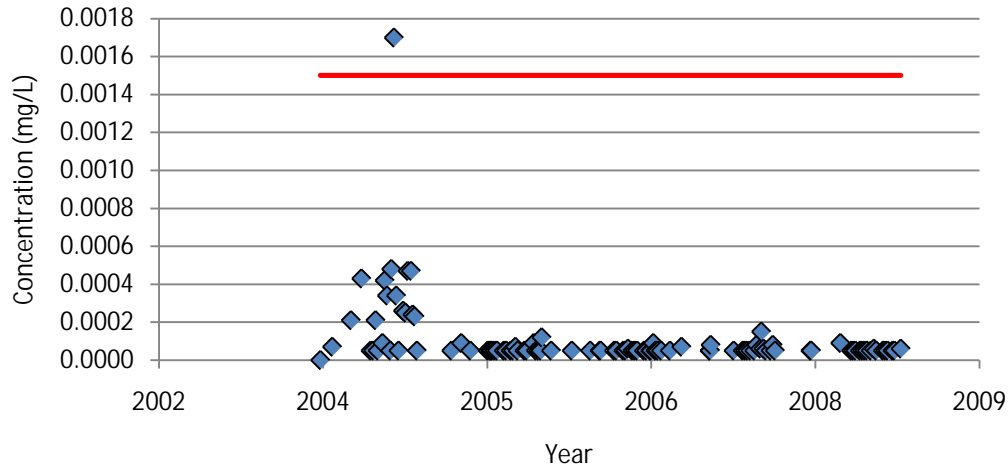
## § Colour, DOC, manganese, temperature, turbidity (naturally occurring – aesthetic)

## § Hardness, pH (naturally occurring – operational)

## § Sodium (naturally occurring & anthropogenic – health)

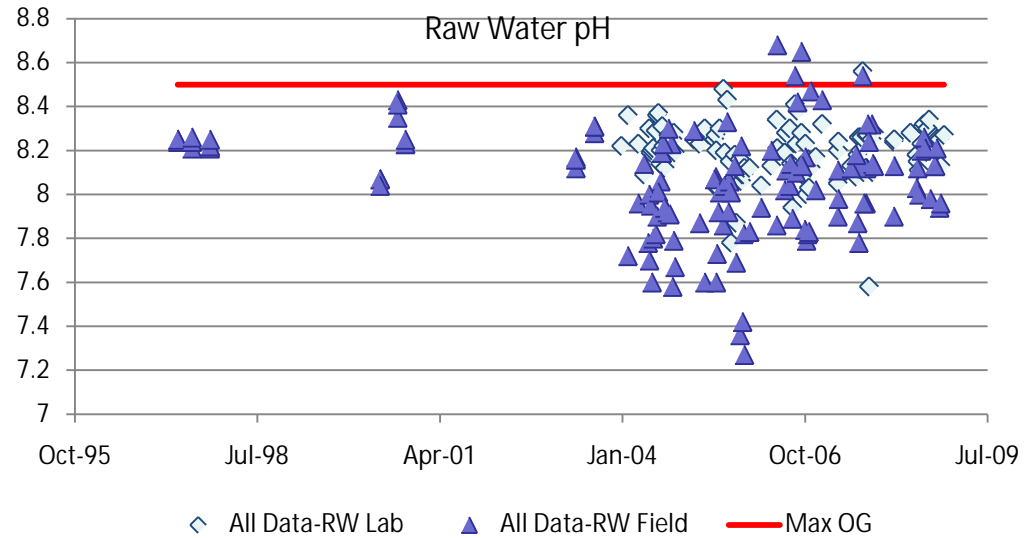
- increasing trend (> 20mg/L in 50 yrs)
- ICA – IPZ-1, 2, 3 – road salt activities, septics

# Bayside – Identified Issues



Microcystin-LR

— ODWQS



# Issues Summary



Site	Schedule 1		Sch. 2	Table 4									
	Total Coliforms	E.coli	NDMA	Colour	DOC	Iron	Manganese	Temperature	Turbidity	Hardness	Aluminum	pH	Sodium
Lakefield	N	N/A	A		N			N	N	N			
Peterborough	N	N/A	A	N	N			N	N	N			
Hastings	N	N/A		N	N		N	N	N	N			
Marmora	N	N/A		N		N	N	N	N	N			
Campbellford	N	N/A		N		N	N	N	N	N	N		
Warkworth	N	N/A										N	
Frankford	N	N/A		N				N	N	N		N	
Batawa	N	N/A											
Trenton	N	N/A			N	N		N	N	N			N/A
Bayside	N	N/A		N	N		N	N	N	N		N	N/A