

InfraGuide

Monitoring Water Quality in the Distribution System

Clean and Safe Drinking Water Workshop

Gander, Newfoundland Sept. 21-23, 2004

National Guide to Sustainable
Municipal Infrastructure





Presentation Agenda

Who am I?

What is InfraGuide?

How are best practices developed?

Best practice for monitoring water quality in the distribution system

- Development team and information sources
- How to develop a program
- Key considerations
- On-line monitoring





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Who Am I?

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Who Am I – Really?



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What is InfraGuide?

- National Guide to Sustainable Municipal Infrastructure
- National network of people
- Published best practice documents

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What is InfraGuide?

Key infrastructure areas



Potable Water



Storm and Wastewater



Roads and Sidewalks



Environmental Protocols



Transit



Decision Making and Investment Planning





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How are Best Practices Developed?

Partners: FCM, NRC, Infrastructure Canada
Currently over 300 active volunteers

- municipalities
- trade organizations
- consulting engineers
- contractors
- suppliers
- politicians
- academics

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How are Best Practices Developed?

- Set topics/priorities
- Committee proposal
- Select consultant (facilitator)
- Set up working group (experts)
- Document development
- Review: technical committee, stakeholder and peers
- Publish





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Published Best Practices

- Available on-line
www.infraguide.ca
- Hard copies
1-866-330-3350
(order form available on-line)
- Regional contact:
Atlantic Provinces - CBCL Limited
Nfld. – Jack Caines 709-364-8623

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Key infrastructure areas



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Decision Making and Investment Planning





Potable Water

- Examine municipal or water utility delivery of drinking water to the public
- Suggest ways to ensure public health and safety at least risk and best value
- Up-to-date technical approaches and practices





Potable Water - Published

1. Deterioration and Inspection of Water Distribution Systems
2. Water Use and Loss in the Water Distribution System
3. Selection of Technologies for the Rehabilitation or Replacement of a Water Distribution System
4. Water Quality in Distribution Systems
5. Establishing a Metering Plan to Account for Water Use and Loss
6. Developing a Water Distribution System Renewal Plan





Potable Water - Review

1. Speed and Quality of Linear System Repairs





Potable Water - Development

1. Monitoring Water Quality in the Distribution System
2. Small System Operation and Maintenance Practices
3. Methodologies for Setting a Cross-Connection Control Program





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Monitoring Water Quality in the Distribution System

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- How to develop a program
- Key considerations
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Development Team

- Working group 12 members
- Consultant facilitator
- InfraGuide technical advisor
- Stakeholder and peer reviewers

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Information Sources

- *Guidance Manual for Monitoring Distribution System Water Quality (AwwaRF)*
- *Online Monitoring for Drinking Water Utilities (AwwaRF/CRS Proaqua)*
- Survey of 11 Canadian municipalities
- Expertise of working group members





How to Develop a Program

- Understand the importance of a Distribution System monitoring program
- Understand your system
- Satisfy regulatory monitoring requirements
- Develop a site-specific program





Key Considerations

1. Determine monitoring parameters
2. Determine monitoring locations
3. Determine monitoring frequency
4. Determine sampling techniques
5. Manage and report monitoring data





Key Considerations

6. Include event-driven monitoring
7. Establish partnerships
8. Develop response procedures
9. Include community monitoring of indicator parameters
10. Maintain and update the monitoring program





1. Monitoring Parameters

- Regulatory requirements
- Public health: chlorine residual, E.coli, disinfection by-products
- Heterotrophic plate count (HPC)
- Many others: turbidity, flow, pressure, ammonia, nitrite, nitrate, temperature, pH, alkalinity, metals, taste, odour, hydrocarbons, etc.





1. Monitoring Parameters

- Treatment process, chemical additions
- Multiple sources
- Distribution system attributes
- Special consumer needs
- Community health concerns
- Historical data





2. Monitoring Locations

- Regulatory requirements
- Historical data
- Sensitive facilities
- Distribution system attributes
- Spatial representation, population/consumer distribution, high flows, system ends
- Operational requirements





3. Monitoring Frequency

- Routine and non-routine
- Regulatory requirements
- Oversampling
- Frequent chlorine – on-line?
- Parameter – time to affect water quality
- Form a history of water quality
- Identify problems – quickly, easily





4. Sampling Techniques

- On-line monitors
- Manual sampling
- Automatic samplers
- Regulatory requirements/frequency
- Remote locations
- Costs – capital and operating
- O&M of equipment





4. Sampling Techniques

- Availability of technology, labs
- Sample storage, preservation, travel
- Sample contamination
- Staff/equipment availability, capability
- Fastest possible receipt of results





5. Data Management

- Data storage and access issues
- Automatic screening and flags:
 1. Results approach unacceptable
 2. Results reach unacceptable
- Computerized system with backup
- Daily review – charts, graphs
- Link to GIS for analysis
- Reporting





6. Event-driven Monitoring

- Procedures for expected events
- Compare with routine results
- Consumer inquiries
- Suspected health problem from drinking water – involve health and province
- Water main break
- Water main flushing and cleaning





6. Event-driven Monitoring

- Fire fighting
- Construction activities
- Operational activities
- Large changes in water usage –
seasonal population, plant shutdown
- Floods and other extreme weather





7. Partnerships

- Stakeholders, public, private groups
- Exchange information on problems
- Educate those impacting system
- Establish partnerships now, meet regularly, communication protocols
- Contribute to training programs





7. Partnerships

- Health and fire departments
- Dept. of Environment and Conserv.
- Regulatory agencies/approvals
- Emergency measures/response
- Building/plumbing inspection
- Labs, pharmacies, wholesale
- Consultants, contractors, suppliers
- Industry and special interest groups





8. Response Procedures

- Determine normal/acceptable limits
- Develop response procedures:
 1. Results approach unacceptable
 2. Results reach unacceptable
- Corrective actions: flushing, chemical dosage, valve operation, shutdown facilities, public notices, re-sampling
- Communication protocols, reporting





9. Community Monitoring

- Health-related community parameters
- Acute, seasonal, chronic conditions
- Over-the-counter medicine, hospital and clinic attendance, disease
- Compare local conditions
- Municipality and health department
- Pharmacies





10. Update and Maintain

- Staff training and updates
- Instrument replacement, calibration
- Document and communicate – summary tables and mapping
- Criteria for change: growth, new construction
- Annual review
- Communicate strengths/weaknesses





On-line Monitoring

- Chlorine, pressure, flow – pumping stations, storage facilities, others
- Technological development
- Combination of on-line monitors and manual sampling
- Evaluate before purchase and installation





On-line Monitoring

- Timely information
- Consumer confidence
- 24/7
- Regulatory standards
- Cost/benefit analysis – capital costs, operating costs, cost savings, water quality, operations, compliance
- Treatment facility first





On-line Monitoring

- Determine locations: manual sampling, historical data
- Communication system: recording, transfer, retrieval, backup, alarms
- Regular maintenance, reagents, staff training, regular calibration
- Power, drain, operational and weather issues





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Questions?

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- Monitoring Water Quality in the Distribution System

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