

## **Water Operator Survey**

### **Survey Consent**

You are being asked to participate voluntarily in a survey as part of a project entitled Exploring Solutions for Sustainable Rural Drinking Water Systems, led by Dr. Kelly Vodden (Environmental Policy Institute, Grenfell Campus, Memorial University) in collaboration with the Professional Municipal Administrators (PMA) and Municipalities Newfoundland and Labrador (MNL). This study is being conducted to identify the types of risks and challenges influencing drinking water quality and availability in rural areas, with a particular emphasis on communities of 1,000 residents or less in Newfoundland and Labrador (NL). This research project is funded by the Harris Centre – RBC Water Research and Outreach Fund.

This survey is being used to collect data related to the realities municipalities and local service districts (LSDs) are facing with their drinking water systems. More information on the project can be found on the project's website: <http://nlwater.ruralresilience.ca>. Also, the results of the survey will be compiled into a report which will be available on the project's website.

The survey will take approximately 15-20 minutes to complete. Your participation in this survey is entirely voluntary and there will be no negative consequences if you refuse to participate in it, withdraw from it, or refuse to answer certain questions. Your participation/identity in the survey will be confidential. All comments and answers you provide will not be attributed to your identity and comments will be generalized to prevent identification of specific municipalities/LSDs.

The survey is designed so that it can be answered without needing any background documentation if being answered by the WATER OPERATOR. Upon completion of the survey responses will be stored in a secure location, will be kept in strict confidence, and only reviewed by members of the research team who have signed a confidentiality agreement. By proceeding with this survey you are indicating your consent to participate.

The proposal for this research has been reviewed by the Grenfell Research Ethics Board and found to be in compliance with Memorial University's ethics policy. If you have ethical concerns about the research (such as the way you have been treated or your rights as a participant), you may contact the Chairperson of the Research Ethics Board through the Grenfell Research Office ([dwstrickland@grenfell.mun.ca](mailto:dwstrickland@grenfell.mun.ca)).

If you have any questions or concerns regarding this survey or the research project in general, please contact Sarah Minnes, project coordinator ([sminnes@grenfell.mun.ca](mailto:sminnes@grenfell.mun.ca)).

Thank you for your time and help in improving Newfoundland and Labrador's drinking water systems, your contribution is truly appreciated!

## General Information

1. Which type of organization do you represent?
  - ☐ Municipality
  - ☐ LSD
2. What is the name of your municipality/LSD?
3. What is the current population of your municipality/LSD?
  - ☐ 200 or fewer
  - ☐ 201-300
  - ☐ 301-400
  - ☐ 401-500
  - ☐ 501-750
  - ☐ 751-1000
  - ☐ 1001-1500
  - ☐ 1501-4000
  - ☐ 4001-9999
  - ☐ 10000 or above
4. In what Municipalities Newfoundland and Labrador (MNL) region is your municipality/LSD located?
  - ☐ Avalon
  - ☐ Central
  - ☐ Eastern
  - ☐ Labrador
  - ☐ Northern
  - ☐ Western
5. Are you a fulltime, parttime or volunteer water operator in your municipality/LSD?
  - ☐ Fulltime
  - ☐ Parttime
  - ☐ Volunteer
6. What is your primary position within your municipality/LSD? Please only select ONE option.
  - ☐ Water operator
  - ☐ Councillor/water operator
  - ☐ Chair person/water operator
  - ☐ Municipal/LSD administrator/water operator
  - ☐ Mayor/water operator
  - ☐ Other (please specify)

7. How long have you been a water operator for?

- ☐ Less than 1 year
- ☐ 1 – 5 years
- ☐ 6 – 20 years
- ☐ More than 20 years

8. What is your highest level of water operating certification? Please only select ONE option.

- ☐ Operator in Training (OIT)
- ☐ Small Systems (Very Small Water Systems and Small Wastewater Systems)
- ☐ Class I
- ☐ Class II
- ☐ Class III
- ☐ Class IV
- ☐ I do not have formal training as administered by the Department of Environment and Conservation
- ☐ Other (please specify)

9. Where do the majority of households in your municipality/LSD get their main source of drinking water? Rank choices from 1 (used as main source) to 4 (least used source)?

- ☐ Municipal/LSD water supply
- ☐ Private source (e.g. personal well)
- ☐ Spring
- ☐ Bottled water

## Water Filtration and Treatment

10. Does your municipality/LSD treat (e.g. any treatment, disinfection or filtration) its drinking water supplied to residents?

- ☐ Yes
  - ☐ No, but it does have water distribution infrastructure (e.g. pipes). Please answer the comment box below.
  - ☐ My municipality/LSD only has a Potable Water Dispensing Unit (PWDU).
  - ☐ No, my municipality/LSD does not have any kind of municipal/LSD water treatment or water infrastructure.
  - ☐ If your municipality/LSD does not treat its water but has municipal/LSD water distribution infrastructure, why do you not treat your water?
- 

11. What method does your municipality/LSD use for filtration of source water? Choose all that apply.

- ☐ Water Filtration and Treatment
- ☐ Type anthracite coal
- ☐ Sand
- ☐ Granular activated carbon
- ☐ Green sand
- ☐ Microfiltration
- ☐ Nanofiltration
- ☐ Reverse osmosis
- ☐ Ultrafiltration
- ☐ My municipality/LSD does not use filtration
- ☐ I don't know
- ☐ Other (please specify)

12. What kind of drinking water treatment processes or treatments does your municipality/LSD use other than disinfection? Choose all that apply.

- ☐ Arsenic removal
- ☐ Coagulation
- ☐ Dissolved air floatation
- ☐ Flocculation
- ☐ Fluoridation
- ☐ Iron/manganese removal
- ☐ Micron/pressure filters
- ☐ pH adjustment
- ☐ Sedimentation
- ☐ Softening
- ☐ Stripping
- ☐ Strontium removal
- ☐ Taste and odor control
- ☐ Upflow clarifier

- ☐ None
- ☐ I don't know
- ☐ Other (please specify)

13. What kind of drinking water disinfection system does your municipality/LSD use? Choose all that apply.

- ☐ Calcium hypochlorite (powder)
- ☐ Chloramines
- ☐ Gas chlorination
- ☐ Liquid hypochlorination
- ☐ Mixed oxidants (MIOX)
- ☐ Ozone
- ☐ Ultraviolet light (UV)
- ☐ None
- ☐ I don't know
- ☐ Other (please specify)

14. How old is your municipality's/LSD's water treatment system/plant (when was the oldest component installed)?

- ☐ Less than 5 years old
- ☐ 5-10 years old
- ☐ More than 10 years – 25 years old
- ☐ More than 25 years – 35 years old
- ☐ Over 35 years old
- ☐ I don't know

15. Does your municipality/LSD have a maintenance plan for its water treatment system/plant operations?

- ☐ Yes
- ☐ No
- ☐ I don't know

16. Does your municipality/LSD have standard operating procedures for its water treatment system/plant operations?

- ☐ Yes
- ☐ No
- ☐ I don't know

17. How often is your municipality's/LSD's water treatment facility maintained (cleaning, part replacement, etc)?

- ☐ Daily
- ☐ Weekly
- ☐ Twice a month
- ☐ Monthly
- ☐ Other (please specify)

18. Are all parts of your municipality's/LSD's water treatment system currently working?  
Choose all that apply.

- ☐ Yes.
- ☐ No, because it is undergoing maintenance or repair
- ☐ No, because of a lack of qualified operators
- ☐ No, because of taste complaints
- ☐ No, because of a lack of funds to operate
- ☐ I don't know
- ☐ No, because of other reasons (please specify)

19. What are the barriers to repairing your municipality's/LSD's water treatment system? Choose all that apply.

- ☐ Lack of expertise/contractors to make upgrades or repairs
- ☐ Lack of availability of parts or supplies needed for upgrades or repairs
- ☐ Lack of financial resources
- ☐ No one qualified to operate system if upgrades or repairs are made
- ☐ Not a priority
- ☐ There are no barriers
- ☐ I don't know
- ☐ Other (please specify)

20. Has your municipality/LSD been under a boil water advisory any time in the last 4 years?

- ☐ Yes
- ☐ No

21. What was the reason(s) for your municipality's/LSD's boil water advisory(ies)? Choose all that apply.

- ☐ Water supply has no disinfection system
- ☐ Chlorination system is turned off by the operator, due to taste or other aesthetic considerations.
- ☐ Chlorination system is turned off by operator, due to perceived health risks.
- ☐ Chlorination system is turned off by operator, due to lack of funds to operate.
- ☐ Disinfection system is off due to maintenance or mechanical failure.
- ☐ Disinfection system is off due to lack of chlorine or other disinfectant.
- ☐ Water distribution system is undergoing maintenance or repairs.
- ☐ A cross connection is discovered in the distribution system.
- ☐ Inadequately treated water was introduced into the system due to fireflows, flushing operations, interconnections, minor power outage or other pressure loss.
- ☐ Water entering the distribution system or facility, after a minimum 20 minute contact time does not have a free chlorine residual of at least 0.3 mg/l or equivalent CT value.
- ☐ No free chlorine residual detected in the water distribution system.
- ☐ Insufficient residual disinfectant in water system primarily disinfected by means other than chlorination.

- ☐ Total coliform detected AND repeat samples cannot be taken as required
- ☐ Escherichia coli (E. coli) detected AND repeat samples cannot be taken as required
- ☐ Total coliforms detected and confirmed in repeat sample.
- ☐ Escherichia coli (E.coli) detected in an initial sample(s) is considered extensive and the water system has other known problems.
- ☐ Escherichia coli (E.coli) detected and confirmed in repeat sample.
- ☐ Viruses detected (eg, Hepatitis A, Norwalk).
- ☐ Protozoa detected (eg, Giardia, Cryptosporidium).
- ☐ Water supply system integrity compromised due to disaster (e.g. contamination of water source from flooding, gross contamination, major power failure, etc.).
- ☐ Waterborne disease outbreak in the community.
- ☐ Other (please specify)

22. Does your municipality/LSD ever release precautionary boil water advisories (for reasons other than regular flushing and maintenance)?

- ☐ Yes
- ☐ No
- ☐ If you answered "yes" what was the reason for the precautionary boil water advisory?

23. Are you made aware of the results of your municipality`s/LSD's drinking water quality reports from the Department of Environment and Conservation?

- ☐ Always
- ☐ Sometimes
- ☐ Never

24. Are you made aware of the bacteriological water quality results from monthly monitoring performed by the Department of Service NL?

- ☐ Always
- ☐ Sometimes
- ☐ Never

## Water Distribution and Maintenance

25. How old is the OLDEST part of your water distribution system for each part of your water distribution system? Answer all that apply.

- ☐ Age (in years)
- ☐ Water distribution pipes
- ☐ Chlorination equipment
- ☐ Pump
- ☐ Other treatment equipment other than chlorination
- ☐ Filtration system (e.g. screens)
- ☐ Chlorine booster station
- ☐ Water storage tank
- ☐ Man made dams

26. How old is the NEWEST part of your water distribution system for each part of your water distribution system? Answer all that apply.

- ☐ Age (in years)
- ☐ Water distribution pipes
- ☐ Chlorination equipment
- ☐ Pump
- ☐ Other treatment equipment other than chlorination
- ☐ Filtration system (e.g. screens)
- ☐ Chlorine booster station
- ☐ Water storage tank
- ☐ Man made dams

27. What material is your water distribution pipes made of? Choose all that apply.

- ☐ Steel
- ☐ Polyvinyl chloride
- ☐ (PVC/uPVC)
- ☐ Ductile iron
- ☐ Cast iron
- ☐ Polypropylene
- ☐ Polyethylene
- ☐ Copper
- ☐ Wood
- ☐ I don't know
- ☐ Other (please specify)

28. What is the average size of your water distribution pipes not including service connections? Choose all that apply.



29. How does water reach the water plant/distribution system in your municipality/LSD?

- ☐ Gravity fed
- ☐ Pumping system
- ☐ Combination of gravity fed and pumping system (e.g. a water tower)
- ☐ Other (please specify)

30. Does the current water demand in your municipality/LSD exceed the design capacity of your water system?

- ☐ Yes
- ☐ No
- ☐ I don't know

31. What is the approximate piping distance from the disinfection system or closest chlorine booster station to the last user on your municipal/LSD system?

- ☐ 1km or less
- ☐ 1.1km-2km
- ☐ 2.1 km-3km
- ☐ 3.1km4km
- ☐ 4.1 km5km
- ☐ Over 5km
- ☐ N/A

32. Is the distance from the disinfection system to the last user on your municipal/LSD system an issue for maintaining disinfection residual?

- ☐ Yes
- ☐ No
- ☐ I don't know
- ☐ N/A
- ☐ If you answered "yes", what measures (if any) have you taken to deal with the distance issue?

33. In 2012, how many leaks were there in your municipality's/LSD's water infrastructure that required repair?

- ☐ None
- ☐ 1-2
- ☐ 3-4
- ☐ 5-6
- ☐ 7-10
- ☐ 11+
- ☐ I don't know

34. How often does your municipality/LSD do leak detection?

- ☐ Once a month
- ☐ Every 2-3 months
- ☐ Every 4-5 months
- ☐ Twice a year
- ☐ Yearly
- ☐ My municipality/LSD does not do leak detection
- ☐ I don't know

## Water Distribution and Maintenance

35. Does your municipality/LSD have an organized leak detection program?

- ☐ Yes
- ☐ No, we only do leak detection when leaks or problems occur
- ☐ I don't know

36. Which of the following methods does your municipality/LSD use for leak detection? Choose all that apply.

- ☐ Acoustic loggers
- ☐ Combined acoustic logger & correlator
- ☐ Deacon meter (waste metering)
- ☐ Digital correlator
- ☐ District meter area analyzing
- ☐ Ground microphones
- ☐ Ground penetrating radar
- ☐ Helical vane meters
- ☐ Leak noise correlator
- ☐ Manual sounding
- ☐ Step testing
- ☐ I don't know
- ☐ Other (please specify)

37. Does your municipality/LSD have an annual valve operating/maintenance program? Water Distribution and Maintenance

- ☐ Yes
- ☐ No
- ☐ I don't know

38. How often does your municipality/LSD flush it's water distribution lines?

- ☐ More than once a month
- ☐ Once a month
- ☐ Every 2-5 months
- ☐ Twice yearly
- ☐ Once a year
- ☐ We do not flush our system
- ☐ I don't know
- ☐ Other (please specify)

39. What are the biggest issues, other than financial constraints, for your water distribution system (e.g. infrastructure)? Choose all that apply.

- ☐ Age of the system (e.g corrosion)
- ☐ Knowledge of system
- ☐ Lack of human resources
- ☐ Lack of maps/drawings (AsBuilts) of infrastructure
- ☐ Leakage
- ☐ Maintenance
- ☐ Source water quality
- ☐ Serving small population over large geographic areas
- ☐ None. My municipality's/LSD's water distribution system does not have any issues.
- ☐ I don't know
- ☐ Other (please specify)

40. How often do you as the water operator test your municipality's/LSD's drinking water for chlorine residual?

- ☐ Operational Issues
- ☐ Daily in one location
- ☐ Daily in two or more locations
- ☐ Weekly
- ☐ Monthly
- ☐ Quarterly
- ☐ I don't know
- ☐ Other (please specify)

41. How often does the Department of Environment and Conservation test your municipality's/LSD's water?

- ☐ Daily
- ☐ Weekly
- ☐ Monthly
- ☐ Quarterly
- ☐ Annually
- ☐ I don't know
- ☐ Other (please specify)

42. How often does the Department of Service NL test your municipality's/LSD's water?

- ☐ Daily
- ☐ Weekly
- ☐ Monthly
- ☐ Quarterly
- ☐ Annually
- ☐ I don't know
- ☐ Other (please specify)

43. Does your municipality/LSD have an updated and accurate map of your municipality's/LSD's water distribution infrastructure (e.g. pipes, valves, etc)? Choose all that apply.

- ☐ Yes, we have maps (AsBuilts) or blue prints for ALL of the water distribution infrastructure
- ☐ Yes, we have maps (AsBuilts) or blue prints for PART(S) of the water distribution infrastructure
- ☐ Yes, we have GIS (Geographic Information System) mapping of the infrastructure
- ☐ Yes, we have a detailed asset management plan for our water system which maps out the system
- ☐ No, we do not have a map of the water distribution infrastructure
- ☐ I don't know

44. Is there a designated office/filing area in your municipality/LSD for drinking water system information?

- ☐ Yes
- ☐ No
- ☐ I don't know

45. Does your municipality/LSD have a written formal maintenance plan for it's water distribution infrastructure (e.g. pipes, valves, etc)?

- ☐ Yes
- ☐ No
- ☐ I don't know

## Human Resources and Training

46. Do you think you have sufficient resources (e.g. financial, human or infrastructure resources) to operate the water system in your municipality/LSD effectively?

- ☐ Yes
- ☐ To some degree
- ☐ No
- ☐ I don't know
- ☐ If you answered "no", what resources do you need to operate the system sufficiently?

47. Do you feel the province provides enough access to provincial water operator training opportunities?

- ☐ Yes
- ☐ No
- ☐ If you answered "no", what could the province improve in regards to their training opportunities?

48. Do you feel that your municipality/LSD provides you with adequate training opportunities to do your job as a water operator?

- ☐ Yes
- ☐ No
- ☐ I don't know

49. Do you think new technologies related to drinking water systems are communicated effectively to water operators either by the Province, the municipality/LSD or other sources (e.g. professional associations)? Please rate your experience from 1-5.

- ☐ Communicated highly effectively
- ☐ Communicated reasonably well
- ☐ Communicated adequately
- ☐ Communicated very poorly
- ☐ Not communicated at all
- ☐ I don't know

50. Who provides you with information about new technologies for drinking water systems? Choose all that apply.

- ☐ Human Resources and Training
- ☐ Atlantic Canada Water and Wastewater Association
- ☐ Companies/industry
- ☐ Municipalities Newfoundland and Labrador (MNL)
- ☐ Municipality/LSD (e.g. your mayor or councillors)
- ☐ Other professional associations (e.g. NEIA)
- ☐ Other water operators
- ☐ Professional Municipal Administrators (PMA)

- ☐ Provincial agencies

51. How are new technologies related to drinking water systems communicated to water operators? Choose all that apply.

- ☐ Newsletters
- ☐ Email
- ☐ Mail
- ☐ Workshops and conferences
- ☐ By Mayors, councillors or municipal/LSD administrators
- ☐ Websites
- ☐ Discussion with other water operators/colleagues
- ☐ Other (please specify)

52. Do you attend the Annual Drinking Water Workshop put on by the Department of Environment and Conservation?

- ☐ Yes every year
- ☐ Almost every year
- ☐ Rarely
- ☐ Never, however I have heard of the Annual Drinking Water Workshop
- ☐ I have never heard of the Annual Drinking Water Workshop
- ☐ I haven't had the opportunity to go to the Annual Drinking Water Workshop (I am still new to my position)

53. How content are you with your compensation for your duties as water operator?

- ☐ Very content
- ☐ Somewhat content
- ☐ Neutral
- ☐ Somewhat discontent
- ☐ Very discontent

54. Do you have employee benefits from your job as a water operator (e.g. medical benefits)?

- ☐ Yes
- ☐ No
- ☐ I don't know

55. What is your salary range for your position as water operator?

- ☐ \$0 (volunteer without any compensation)
- ☐ \$1-\$9,999
- ☐ \$10,000-\$19,999
- ☐ \$20,000-\$29,999
- ☐ \$30,000-\$39,999
- ☐ \$40,000-\$49,999
- ☐ \$50,000-\$59,999
- ☐ \$60,000-\$69,999
- ☐ \$70,000 and above
- ☐ I would prefer not to share this information
- ☐ I am compensated in other ways that does not include a salary (e.g. having your taxes paid for you). Please specify: \_\_\_\_\_

56. Which of these land use activities do you think are currently threats to your main municipal/LSD's water supply? Choose all that apply.

- ☐ Agriculture
- ☐ Commercial forest harvesting
- ☐ Domestic wood cutting
- ☐ Hunting and fishing
- ☐ Hydroelectricity (damming)
- ☐ Mining (including quarrying)
- ☐ Oil and gas exploration and development (including hydraulic fracturing/fracking)
- ☐ Recreational use (e.g. swimming, snowmobiling, boating)
- ☐ Residential cabin development
- ☐ Transmission lines and roads
- ☐ None there are no land use activities that I believe are threats to my municipal/LSD water supply
- ☐ Other (please specify)

57. Which of these natural processes are currently threats to your municipality's/LSD's main water supply. Choose all that apply.

- ☐ Source Water Threats
- ☐ Beaver dams
- ☐ Drought/low water levels
- ☐ Extreme weather events (e.g. high winds, heavy rains)
- ☐ Flooding
- ☐ Freeze/thaw
- ☐ Salt water intrusions
- ☐ None there are no natural processes that I believe are threats to my municipal/LSD's water supply
- ☐ Other (please specify)



58. Which of the following are concerns for your municipal/LSD water system? Choose all that apply.

- ☐ Aesthetics visual qualities of colour and cloudiness
- ☐ Naturally occurring metals (e.g. lead, arsenic)
- ☐ Organic carbon content
- ☐ Acidity
- ☐ Presence of disease causing microorganism (e.g. E.Coli and Giardia)
- ☐ Human pollution (e.g. car wrecks, garbage, illegal dumping)
- ☐ Endocrine disrupting chemicals (EDCs) (e.g. drugs, cosmetics, and pesticides)
- ☐ I don't know
- ☐ None there are no concerns that I believe are threats to my municipal/LSD's water supply
- ☐ Other (please specify)

59. Are there any new or innovative drinking water solutions that your municipality/LSD has implemented or considered? If no, please skip question. \_\_\_\_\_

60. Are there actions that your municipality/LSD has tried in the past to address drinking water issues that have not worked or not worked well? If no, please skip question. \_\_\_\_\_

61. Are there any other comments regarding drinking water systems in your municipality/LSD or elsewhere that you would like to include? Please explain any problems either covered or not in the survey. \_\_\_\_\_