STANDARD OPERATING PROCEDURE

FOR THE DEVELOPMENT AND APPROVAL OF REGULATED MUNICIPAL DRINKING WATER SYSTEM SAMPLING PLANS

VERSION 3.0

April 2024
Department of Environment and Local Government

New Nouveau Brunswick

Preface

This documentation was developed by the New Brunswick Department of Environment and Local Government (DELG) based on the guiding principles of protection of human health and the environment. It is intended to assist those involved with municipal drinking water sampling plan development and approval.

This version supersedes the *Guidance Document for the Development and Approval of Regulated Drinking Water System Sampling Plans* (May 2014) and the *Standard Operating Procedure for the Development and Approval of Regulated Drinking Water System Sampling Plans* (May 2014).

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Table of Contents

Tables

Figures

Appendices

1.0 Introduction

A sampling plan is required for the operation of each drinking water system that is regulated under the *Clean Water Act* (CWA) - *Potable Water Regulation*. Per section 7(1):

An owner of a regulated water supply system shall

(a) have a sampling plan that is approved by the Minister, and
(b) ensure that the water in the system is collected and tested in accordance with the sampling plan.

The sampling plan states the frequency, parameters and location of where drinking water samples are to be taken. Per section 8(1):

A sampling plan shall be on a form provided by the Minister and shall include the following information:

(a) the frequency with which the samples of the water are to be collected from the regulated water supply system for the purpose of testing;
(b) a list of the substances that the regulated water supply system is to be tested for;
(c) a description of each location in the regulated water supply system where the samples of the water are to be collected;
(d) Repealed: 2014-26
(e) Repealed: 2014-26
(f) the date that the sampling plan is to commence; and
(g) any other information that that [sic] *Minister considers necessary.*

There are three (3) purposes of the sampling plan:

- to provide the **System Owner** with water quality and chemistry analysis results as a quality assurance measure used to ensure the delivery of safe and reliable drinking water to its users;

- to provide the **Department of Health (DH)** with water quality and chemistry analysis results for use in public health risk assessment, particularly when there are exceedances of safe levels of chemical or microbiological properties; and

- to provide the **Department of Environment and Local Government (DELG)** with water quality and chemistry analysis results for the purpose of approval to operate condition compliance.

2.0 Scope and Purpose

The purposes of this Standard Operating Procedure (SOP) are:

- to provide the **DELG** and the **DH** with an understanding of the process for approving a sampling plan for a municipal regulated water supply system as defined in the *Potable Water Regulation* under the *Clean Water Act*;
- to provide municipal regulated drinking water **System Owners** with an understanding of how to develop a new sampling plan or modify an existing sampling plan based on the zone-based system; and,
- to define the minimum requirements in terms of frequencies and parameters that shall be used as a guide when developing the sampling plan.

The goal of this SOP is to establish sampling plan consistency among regulated drinking water systems and define roles in approving sampling plans.

3.0 Sampling Plan Management Process

3.1 STAKEHOLDER ROLES AND RESPONSIBILITIES

Table 3.1 Key Roles

Stakeholder	Responsibilities
System Owner	• Develop and submit a sampling plan in accordance with the minimum requirements in the *Potable Water Regulation,* the latest version of the SOP and any additional requirements per the **DH** and/or the **DELG**. • Notify the **DELG** and the **DH without delay** when changes to the sampling plan are required (see section 3.2 for more detail). • Collect samples in accordance with the most recent **DELG** approved sampling plan.

DELG	**<u>Approvals Engineer/Coordinator</u>** • Review and approve new or revised sampling plans in accordance with the latest version of the SOP and any requirements of the **DH**. • Ensure the most recent final sampling plan is provided to the **System Owner** and the **DH,** and is updated in the drinking water database. • Verify compliance with the approved sampling plan. **<u>Drinking Water Program Coordinator</u>** • Assign a sample identifier (SID) to all sampling locations. • Update the relevant documentation found in the drinking water database. • Alarm set-up and modification in the drinking water database.
DH[1]	• Review and approve new or revised sampling plans submitted by the **System Owner**. • To ensure potable drinking water risk mitigation, verify compliance to the approved sampling plan.

[1] The DH works with the Health Protection branch at the Department of Justice and Public Safety to carry out a part of this work.

3.2 GENERAL PROCESS

In accordance with the requirements of the *Potable Water Regulation* under the *Clean Water Act*, the sampling plan approval process is as follows:

Creation or amendment of sampling plans:

- The **System Owner** shall submit, electronically, to the **DELG**, a draft version of the sampling plan, in conformance with the latest version of the SOP and on the DELG Sampling Plan Templates (see Appendix A). The sampling plan shall also include a digital map showing the location of sampling zones. The **System Owner** shall notify the **DELG** and the **DH** immediately when changes to the sampling plan are required.
- In cases where the **System Owner** is seeking approval to amend a sampling plan to modify a sample parameter or frequency, a written application shall be submitted to the **DELG** and **DH**, and supported with water quality data and justification for the requested change. If a system owner is requesting a reduction in sampling additional information may be required to make a determination on the request.

Note: There are a variety of situations when an existing sampling plan may need to be amended, such as: increases in population served, a new water source, addition of new subdivisions, addition of distribution system looping, changes to water treatment and/or disinfection, new parameter(s) of concern. In all cases, sampling plans shall be amended and approved before the changes occur. Further, the **DELG** and/or the **DH** may modify a sampling plan without the consent of the **System Owner** if written rationale for the changes is provided before making the amendment.

Review and finalization of sampling plans:

- After reviewing the draft sampling plan to ensure it conforms to the minimum requirements, and based on feedback from the **DH**, which may include a requirement for additional sampling for specific parameters or increased sampling frequency based on past water quality, the **DELG** will contact the **System Owner** to discuss any issues further, if necessary.
- Following discussions with the **System Owner**, a final draft sampling plan will be submitted via email by the **System Owner** to the **DELG**.
- The **DELG** will create new SIDs for sampling location and incorporate the SIDs into the final sampling plan.
- The **DELG** will forward the final approved sampling plan to the **System Owner**. A copy will also be forwarded to the **DH** for their records.
- The **DELG** will save the final approved sampling plan and zone map in the drinking water database and update any related information.

4.0 Sampling Plan Content Requirements

4.1 GENERAL INFORMATION

This section provides the reader with general information regarding the **System Owner** and system, and shall contain the following information:

- The **System Owner** shall be clearly identified by its legal name;
- The population served by the drinking water system shall be identified as accurately as possible, preferably within 100 persons;
- The type of treatment such as filtration, coagulation/flocculation, softening, biofiltration, oxidation, screening, pH adjustment, activated carbon, fluoridation, or corrosion control that is applicable;
- The type of disinfection such as chlorination, ultraviolet light, ozone or any other means of disinfection;
- It shall be indicated if the drinking water system uses a means of disinfection providing a residual in the distribution system such as chlorination;

- If the **System Owner** has more than one system, all systems need to be included in one (1) sampling plan:
    - All of the items detailed above shall be included for each system;
    - The names of each system needs to be included, as this will be used in the drinking water database to differentiate the sampling locations.

4.2 SAMPLE LOCATIONS

4.2.1 Site Specific Locations

Sampling from the various drinking water system components consist of a sample from one (1) discrete location. System components include the Sources such as the wells, an infiltration gallery, or a treatment plant, but also can be a reservoir, a booster station, etc.
Examples for the sampling plan ''Reason for the site'' for site specific locations are as follow:

- Raw Water
- Back-up (Raw Water)
- Finished water prior to disinfection
- Finished water after disinfection

4.2.2 Distribution System Locations

Distribution system locations are based on Sampling Zones. The **System Owner** may collect a sample from any site within a defined and agreed upon zone within the distribution system.
Sampling Zones should be established by the **System Owner** in consultation with the **DELG** and the **DH.**

Examples for the sampling plan ''Reason for site'' for distribution system locations that apply to the entire selected zone are as follows:

- First User(s)
- Last User(s)
- Extremity(ies)
- Dead end(s)
- Geographically appropriate

The figure below illustrates the concept of selecting zones based upon the sample's reason for the site.

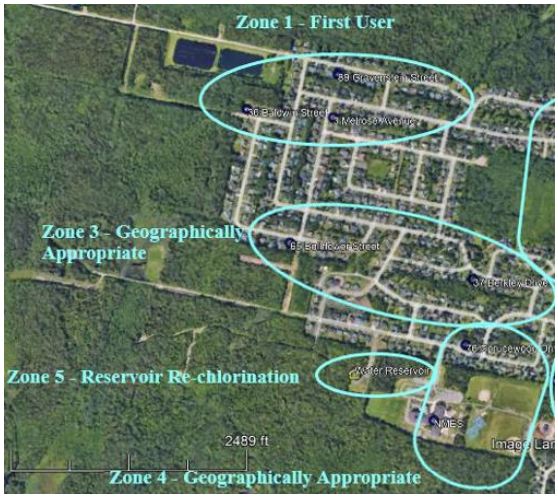

Figure 4.1 Sampling Zone Map Example

The size and configuration of a zone should be based upon the sample's reason for the site. For example, a sample from a "First User" zone should truly be a sample from one of the first users of water in the system.

A zone map will need to be created that clearly identifies each zone. The resolution and details of the zone map should be sufficient to ensure that each possible sampling location within a zone is easily recognizable on the map. Zones should be created using straight lines or long curves to facilitate its transfer on a GIS mapping program. Zones do not need to include the complete drinking water distribution system, but they must provide a good representation of the entire system.

Before any sample location is added to a sampling plan, it shall be assigned a Site Name and Site Identifier (SID). All sample locations will be named according to **DELG**'s Site Naming Convention (see Section 5.0) and maintained by the **DELG** using the drinking water database.

4.3 SAMPLE PARAMETERS AND FREQUENCIES

Sample parameters and frequency shall meet the minimum requirements prescribed by the **DH**, as follows:

Table 4.1 Sample Parameters and Frequencies

BACTERIOLOGICAL (C, H)	
Frequency (per site/zone)	**C** - Total coliform and E. Coli **Source(s):** Every 4 weeks (13 times/yr) **Distribution System:** Every 4 weeks (13 times/yr)
	H - Heterotrophic Plate Count **Distribution System:** Quarterly (4 times/yr)
Number of Samples	• **Source(s):** 1 sample per raw water source • **Distribution system:** 4 zones (4 samples) or 1 zone (1 sample) per 1,000 population served, whichever is greater[2]
INORGANIC (I)	
Frequency (per site/zone)	• **Source(s):** *Groundwater* – Annually *Surface water* – Bi-annually (2 times/yr) • **Distribution system:** Annually
Number of Samples	• **Source(s):** 1 sample per raw water source • **Distribution system:** 1 zone (1 sample) or 1 zone (1 sample) per 10,000 population served, whichever is greater
ORGANIC (O)	
Frequency (per site/zone)	• **Source(s):** *Groundwater* - Bi-annually (2 times/yr) *Surface* water - Quarterly (4 times/yr) • **Distribution system:** Bi-annually (2 times/yr)
Number of Samples	• **Source(s):** 1 sample per raw water source • **Distribution system:** 2 zones (2 samples; first-user and end-user) for systems serving up to 10,000 population served. For every 10,000 population served increases, add 1 additional zone (sample).
OTHER - X	
Frequency (per site/zone)	If required, to be determined by DH
Number of Samples	If required, to be determined by DH

[2] Bacteriological samples from the distribution system zones shall be distributed **evenly** during the 4-week period and alternated (4-week rotation). For systems with:

- *4 to 7 zones: At least **one (1) C** sample weekly;*
- *8 to 11 zones: At least **two (2) C** samples weekly;*
- *12 to 15 zones: At least **three (3) C** samples weekly.*

Note: In some cases, it is possible that a municipal sampling plan, in consultation with the **DH,** may have sampling plan requirements that are different from the minimum requirements identified in Table 4.1 (i.e. reduction/increase of sample parameters and/or frequencies).

5.0 Sample Location Naming Convention

System Owners shall follow the sampling location naming referenced below. Construct the plain language descriptors as follows:

5.1 SITE SPECIFIC LOCATIONS

All sampling plans shall assign a system component name followed by the address of the physical location for all sampling locations that are a physical component of the system such as the sources, a water treatment plant, a reservoir, etc. Examples of naming conventions for these are:

- Well #1, 10 Main Street
- Infiltration Gallery, 123 Main Street
- Water Treatment Plant, 234 Main Street
- Reservoir Haut-Lamèque, Route 120

5.2 DISTRIBUTION SYSTEM LOCATIONS

All sampling plans shall assign "Zone" followed by a common name describing the neighbourhood or environments representing the part of the system where the zone resides. Examples of naming conventions for these are:

- Zone #1 – near 123 Maple Street
- Zone #2 – near Pacific Drive
- Zone #3 – Westside
- Zone #4 – Downtown

5.3 TEMPORARY SITES

All sampling plans shall maintain at least one (1) temporary site per drinking water system for all sampling events that are associated with temporary watermains, watermain breaks, new pipe installation, or new connections.

Further, if required and/or useful for the **System Owner**, more than one (1) temporary site per drinking water system can be utilized if they are separated under different categories.

Examples of naming conventions for temporary sites in the sampling plan are:

- Temporary Site 1 – New Connections “System name”
- Temporary Site 2 – New Watermain “System name”
- Temporary Site # – Watermain Breaks
- Temporary Site # – Temporary Watermain

Appendix A - Templates

Sampling Plan - Single System

CLEAN WATER ACT - SAMPLING PLAN LOI SUR L'ASSAINNISSEMENT DE L'EAU - PLAN D'ÉCHANTILLONNAGE				
General Information / information générale				
Municipality / municipalité:		**Municipality's name**		
Population served / population desservie:	+/-	999		
Treatment / traitement:	**Yes / oui**		**No / non**	X
Source disinfection / désinfection à la source:	**Yes / oui**	X	**No / non**	
Residual disinfection / désinfection résiduelle:	**Yes / oui**	X	**No / non**	
Sample Locations / lieux d'échantillonnage				
Water supply sources / sources d'approvisionnement en eau		**Site code / code du site**	**Reason for site / raison d'être du site**	**Parameters / paramètres**
Well #1, adresss			Raw Water	C H I O
Well #2, address			Raw Water	C H I O
Well #3, address				
Distribution system sites (zones) (civic address) / sites (zones) du réseau de distribution (adresse civique)		**Site code / code du site**	**Reason for site / raison d'être du site**	**Parameters / paramètres**
Zone 1 -			First User	C H
Zone 2 -			Geographically appropriate	C H O
Zone 3 -			Last User	C H I O
Zone 4 -			Extremity	C H
Temporary Site				

Frequency and Number of Samples / fréquence et nombre d'échantillons

BACTERIOLOGICAL / BACTÉRIOLOGIQUE (C, H)

Total coliform & *E. Coli* / coliformes totaux et *E. coli*

	Sample locations	Frequency - times / yr	Number of Samples
Source(s):	3 Wells	**Every 4 weeks** - 13 times / yr	3 x 13 = 39 samples / yr
Distribution System:	4 Zones*	**Every 4 weeks** - 13 times / yr	4 x 13 = 52 samples / yr

*Notes : * Zones within the Distribution System must be distributed evenly during the 4 weeks period (e.i. at least **one zone per week**), and alternated.*

TOTAL: 999 / yr

Heterotrophic Plate Count / bactéries hétérotrophes

	Sample locations	Frequency - times / yr	Number of Samples
Source(s):	3 Wells	**Every 3 months** - 4 times / yr	3 x 4 = 12 samples / yr
Distribution System:	4 Zones	**Every 3 months** - 4 times / yr	4 x 4 = 16 samples / yr

Notes :

TOTAL: 999 / yr

INORGANIC / INORGANIQUE (I)

	Sample locations	Frequency - times / yr	Number of Samples
Source(s):	3 Wells	**Every year**	3 samples / yr
Distribution System:	1 Zone (*Zone 3*)	**Every year**	1 sample / yr

Notes :

ORGANIC / ORGANIQUE (O)

	Sample locations	Frequency - times / yr	Number of Samples
Source(s):	3 Wells	**Every 6 months** - 2 times / yr	3 x 2 = 6 samples / yr
Distribution System:	2 Zones (*Zone 2 et 3*)	**Every 6 months** - 2 times / yr	2 x 2 = 4 samples / yr

Notes :

OTHER / AUTRE X -

	Sample locations	Frequency - times / yr	Number of Samples
Source(s):			
Distribution System:			

Notes :

Parameters / paramètres

C : Coliform / coliformes *- Total coliforms & E. Coli / coliformes totaux et E. coli.*
H : Heterotrophic Plate Count / bactéries hétérotrophes

O : Organic / organique *- benzene, benzo(a)pyrene, carbon tetrachloride, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, dichloromethane, ethylbenzene, pentachlorophenol, tetrachloro-ethylene (Perc), toluene, trichloroethylene, total trihalomethanes, chloroform, bromodichloromethane, dibromochloromethane, bromoform, vinyl chloride, total xylenes / benzène, benzo(a)pyrène, tetrachlorure de carbone, 1,2-dichlorobenzène, 1,4-dichlorobenzène, 1,2-dichloroéthane, dichlorométhane, éthylbenzène, pentachlorophénol, tétrachloroéthylène, toluène, trichloroéthylène, trihalométhanes totaux, chloroforme, bromodichlorométhane, dibromochlorométhane, bromoforme, chlorure de vinyle, xylènes totaux*

I : Inorganic / inorganique *- aluminum, antimony, arsenic, barium, boron, cadmium, chromium, copper, fluoride, iron, lead, manganese, mercury, nitrate, selenium, thallium, turbidity, uranium / aluminium, antimoine, arsenic, baryum, bore, cadmium, chrome, cuivre, florure, fer, plomb, manganèse, mercure, nitrate,sélénium, thallium, turbidité, uranium*

X : Other / Autre *-*

Sampling Plan - Multiple Systems

CLEAN WATER ACT - SAMPLING PLAN LOI SUR L'ASSAINNISSEMENT DE L'EAU - PLAN D'ÉCHANTILLONNAGE			
General Information / information générale			
Municipality / municipalité:	**Municipality's Name**		
Population served / population desservie:	**System 1 NAME** ~999	**System 2 NAME** ~999	**System 3 NAME** ~999
Treatment / traitement:	**Yes / oui or No/Non**	**Yes / oui or No/Non**	**Yes / oui or No/Non**
Source disinfection / désinfection à la source:	**Yes / oui or No/Non**	**Yes / oui or No/Non**	**Yes / oui or No/Non**
Residual disinfection / désinfection résiduelle:	**Yes / oui or No/Non**	**Yes / oui or No/Non**	**Yes / oui or No/Non**

Sample Locations / lieux d'échantillonnage

Water supply sources / sources d'approvisionnement en eau	Site code / code du site	Reason for site / raison d'être du site	Parameters / paramètres
System 1 NAME			
Well #1, address		Raw Water	CHIO
Well #2, address		Raw Water	CHIO
System 2 NAME			
Infiltration Gallery, address		Raw Water	CHIO

Distribution system sites (zones) (civic address) / sites (zones) du réseau de distribution (adresse civique)	Site code / code du site	Reason for site / raison d'être du site	Parameters / paramètres
System 1 NAME			
Zone 1 -		Extremity	CH
Zone 2 -		Geographically Appropriate	CH
Zone 3 -		First User	CHO
Zone 4 -		Last User	CHIO
Temporary Site			
System 2 NAME			
Zone 1 -		Extremity	CH
Zone 2 -		Geographically Appropriate	CH
Zone 3 -		First User	CHO
Zone 4 -		Last User	CHIOX
Temporary Site			

Frequency and Number of Samples / fréquence et nombre d'échantillons

BACTERIOLOGICAL / BACTÉRIOLOGIQUE (C, H)

Total coliform & *E. Coli* / coliformes totaux et *E. coli*

	Sample locations	Frequency - times / yr	Number of Samples
System 1 NAME			
Source(s):	2 Wells	**Every 4 weeks** - 13 times / yr	2 x 13 = 26 samples / yr
Distribution System:	4 Zones*	**Every 4 weeks** - 13 times / yr	4 x 13 = 52 samples / yr
System 2 NAME			
Source(s):	Infiltration Gallery	**Every 4 weeks** - 13 times / yr	1 x 13 = 13 samples / yr
Distribution System:	4 Zones*	**Every 4 weeks** - 13 times / yr	4 x 13 = 52 samples / yr
*Notes : * Zones within each Distribution System must be distributed evenly during the 4 weeks period (e.i. at least **one zone per week**), and alternated.*			TOTAL: 999 / yr

Heterotrophic Plate Count / bactéries hétérotrophes

	Sample locations	Frequency - times / yr	Number of Samples
System 1 NAME			
Source(s):	2 Wells	**Every 3 months** - 4 times / yr	2 x 4 = 8 samples / yr
Distribution System:	4 Zones	**Every 3 months** - 4 times / yr	4 x 4 = 16 samples / yr
System 2 NAME			
Source(s):	Infiltration Gallery	**Every 3 months** - 4 times / yr	1 x 4 = 4 samples / yr
Distribution System:	4 Zones	**Every 3 months** - 4 times / yr	4 x 4 = 16 samples / yr
Notes :			TOTAL: 999 / yr

INORGANIC / INORGANIQUE (I)

	Sample locations	Frequency - times / yr	Number of Samples
System 1 NAME			
Source(s):	2 Wells	**Every year**	2 samples / yr
Distribution System:	1 Zone	**Every year**	1 sample / yr
System 2 NAME			
Source(s):	Infiltration Gallery	**Every 6 months** - 2 times / yr	1 x 2 = 2 samples / yr
Distribution System:	1 Zone	**Every 6 months** - 2 times / yr	1 x 2 = 2 samples / yr
Notes :			

ORGANIC / ORGANIQUE (O)

	Sample locations	Frequency - times / yr	Number of Samples
System 1 NAME			
Source(s):	2 Wells	**Every 6 months** - 2 times / yr	2 x 2 = 4 samples / yr
Distribution System:	2 Zones	**Every 6 months** - 2 times / yr	2 x 2 = 4 samples / yr
System 2 NAME			
Source(s):	Infiltration Gallery	**Every 3 months** - 4 times / yr	1 x 4 = 4 samples / yr
Distribution System:	2 Zones	**Every 3 months** - 4 times / yr	2 x 4 = 8 samples/ yr
Notes :			

OTHER / AUTRE X - Trihalomethanes (THMs)

	Sample locations	Frequency - times / yr	Number of Samples
System 2 NAME			
Distribution System:	1 Zone	**Every year**	1 sample / yr
Notes :			

Parameters / paramètres

C : Coliform / coliformes - *Total coliforms & E. Coli / coliformes totaux et E. coli.*
H : Heterotrophic Plate Count / bactéries hétérotrophes

O : Organic / organique - *benzene, benzo(a)pyrene, carbon tetrachloride, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, dichloromethane, ethylbenzene, pentachlorophenol, tetrachloro-ethylene (Perc), toluene, trichloroethylene, total trihalomethanes, chloroform, bromodichloromethane, dibromochloromethane, bromoform, vinyl chloride, total xylenes / benzène, benzo(a)pyrène, tetrachlorure de carbone, 1,2-dichlorobenzène, 1,4-dichlorobenzène, 1,2-dichloroéthane, dichlorométhane, éthylbenzène, pentachlorophénol, tétrachloroéthylène, toluène, trichloroéthylène, trihalométhanes totaux, chloroforme, bromodichlorométhane, dibromochlorométhane, bromoforme, chlorure de vinyle, xylènes totaux*

I : Inorganic / inorganique - *aluminum, antimony, arsenic, barium, boron, cadmium, chromium, copper, fluoride, iron, lead, manganese, mercury, nitrate, selenium, thallium, turbidity, uranium / aluminium, antimoine, arsenic, baryum, bore, cadmium, chrome, cuivre, florure, fer, plomb, manganèse, mercure, nitrate,sélénium, thallium, turbidité, uranium*

X : Other / autre *- Trihalomethanes / Trihalométhanes*