

Watermain Disinfection Procedure

August 1, 2020

Ministry of the Environment, Conservation and Parks
Environmental Assessment and Permissions Division
2020

TABLE OF CONTENTS

	Page
Preface	1
1. Addition, Modification, Replacement, Extension and Planned Maintenance	2
1.1. New Watermains	2
1.1.1. Backflow Prevention Requirements for New Watermains	2
1.1.2. Disinfection of New Watermains	2
1.1.3. Microbiological Samples for New Watermains	4
1.1.4. Connecting New Watermains to the Existing System	5
1.1.4.1. Connections Equal to or Less than One Pipe Length (Generally ≤ 6 m)	5
1.1.4.2. Connections Greater than One Pipe Length (Generally > 6 m)	5
1.1.4.3. Placing New Watermains into Service	6
1.2. Relining of Watermains	6
1.3. Planned Watermain Inspection and Cleaning	7
1.4. Planned Maintenance of Appurtenances and Fittings	7
1.5. Tapping of Watermains	7
1.6. Service Pipes	8
1.7. Return to Service of Watermains Isolated from the Distribution System	8
2. Watermain Disinfection Procedures for Emergency Repairs	8
2.1. Categorization and Public Agency Notification of Watermain Breaks	8
2.1.1. Category 1	9
2.1.2. Category 2	9
2.1.3. Public Agency Notification	9
2.1.3.1. Category 1	9
2.1.3.2. Category 2	9
2.2. Watermain Break Disinfection Procedure Common to Categories 1 and 2	10
2.2.1. Maintenance of Flow	10
2.2.2. Excavation Dewatering	10
2.2.3. Disinfection of Pipe and Repair Parts	10
2.2.4. Installation of Repair Parts	11
2.2.5. Post-Repair Flushing and Return to Normal Service	11
2.3. Additional Information for Category 1 Watermain Break Repairs	11
2.3.1. Microbiological Samples (Optional)	11
2.4. Additional Requirements for Category 2 Watermain Break Repairs	12
2.4.1. Removal of Contaminants from Watermain	12
2.4.2. Additional Disinfection Procedures	12
2.4.3. Microbiological Samples (Mandatory)	12
2.4.4. Special Case - Sewage Contamination	12
2.4.5. Special Case – Chemical Contamination	13

3. Documentation	13
3.1. Documentation for New Watermains	13
3.2. Documentation for Watermain Maintenance and Repairs	14
Appendix A - Examples of Reduced Pressure Principle Backflow Preventer Installations	16
Appendix B - 1.1.4.2 Exception for Connections Greater than One Pipe Length	19
Appendix C - Tools to Help Determine the Category of Watermain Break - Flowchart	20
Appendix D - Tools to Help Determine the Category of Watermain Break - Pictures	21
Appendix E – Category 1 Flowchart	23
Appendix F – Category 2 Flowchart	24
Appendix G – Category 2 – Special Cases Flowchart	26
Appendix H - Definitions	27

Preface

This watermain disinfection procedure is a supporting document for Ontario legislation and regulations related to *Drinking Water*. Schedule B, Condition 2.3 of the Drinking Water Works Permit adopts this procedure by reference. Where this procedure makes reference to ANSI/AWWA Standard C651 “Disinfecting Water Mains” and “CSA Standards B64.10 and B64.10.1”, the most current versions of the standard shall be used. The section numbers mentioned in this document are based on the 2014 version of C651 and the March 2017 version of B64.10 and B64.10.1; however, when updated versions of the standard are released, the corresponding section(s) and amended wording of the updated version will supersede the requirements of the previous version. Definitions listed in Appendix H are capitalized and italicized throughout this procedure.

The requirements in this procedure apply to all watermains of any size, including temporary watermains. *Service Pipes* of 100 mm diameter and greater shall be considered as watermains for the purposes of this procedure.

Operating Authorities shall use *Certified Operators* for activities that must be performed by a *Certified Operator* or may use a *Water Quality Analyst* for sampling and testing if permitted through regulation. Watermains that form part of a *Drinking Water System* can only be *Isolated* and placed into service by *Certified Operators*. Activities performed on *Isolated* watermains are not required to be performed by *Certified Operators*.

Any water used for the purposes of, but not limited to, flushing, swabbing, disinfection, hydrostatic testing, and displacing water to obtain samples for testing, shall be *Drinking Water*. Any temporary water supply to a new watermain shall be *Flushed* prior to its use as a water source.

Chemicals used for disinfection shall meet the requirements of both the American Water Works Association (“AWWA”) and the American National Standards Institute (“ANSI”) safety criteria standards NSF/ANSI/CAN 60.

Operating Authorities may use best management practices that exceed the minimum requirements in this procedure.

Deviations from this procedure may be requested from the *Ministry’s* Approval and Licensing office on a case-by-case basis.

1. Addition, Modification, Replacement, Extension and Planned Maintenance

1.1. New Watermains

For watermains, including temporary watermains, that are added to, modified, re-aligned, replaced or extended within a *Drinking Water System*, Operating Authorities shall ensure that the requirements of ANSI/AWWA Standard C651 are followed as modified by this procedure.

1.1.1. Backflow Prevention Requirements for New Watermains

The *Backflow Prevention* provisions within Section 4.8.9 of ANSI/AWWA Standard C651 shall be mandatory for the installation of new watermains except for *Connections* (see section 1.1.4).

Where required, *Backflow Prevention* for new watermains shall be accomplished by:

- an air gap as defined in CSA Standard B64.10 “Selection and Installation of Backflow Preventers”; or
- A CSA-certified reduced pressure principle (RP) backflow preventer that has been selected and field tested in accordance with CSA Standards B64.10 and B64.10.1. Examples of RP backflow preventer installations are shown in Figures A-1 and A-2, while schematic representations are shown in Figures A-3 and A-4, respectively, of Appendix A.

Exception: If a backflow preventer is relocated within the same day, testing is only required for the first installation of the day provided that the backflow preventer is relocated by a *Certified Operator* who will guard against damage during transit and re-installation.

For the purposes of CSA Standard B64.10, a backflow prevention tester’s licence shall be an Ontario Water Works Association (OWWA) Certified Cross Connection Control Specialist Certificate or a *Ministry*-approved equivalent. In addition to the list of professionals in Table 1 of Figure E.1. of CSA Standard B64.10, a *Certified Operator* or a *Water Quality Analyst* with a backflow prevention tester’s licence shall also be authorized to test, install, relocate, repair or replace backflow preventers used in the installation and commissioning of new watermains.

1.1.2. Disinfection of New Watermains

For preliminary flushing prior to disinfection referred to in Sections 4.4.2 and 4.5.2 of ANSI/AWWA Standard C651, if the requirements of ANSI/AWWA Standard C651 for a velocity of 3.0 ft/sec (0.91 m/sec) are not practical, alternative cleaning consisting of swabbing or flushing 2-3 pipe volumes can be used at the discretion of the Operating Authority.

Where a newly constructed watermain is disinfected using the tablet, continuous feed, slug, or spray chlorination method (not limited to large transmission mains) as per the procedures in ANSI/AWWA Standard C651, the minimum contact times, initial chlorine concentrations, and

maximum allowable decreases in chlorine concentration as listed in Table 1 shall be used. The disinfection method used is at the discretion of the Operating Authority.

When using the Tablet or Continuous Feed Disinfection Method, if the Maximum Allowable Decrease in Chlorine Concentrations is exceeded at any of the sampling points, the disinfection procedure must be repeated.

When using the Slug Disinfection Method, the chlorine concentration shall be measured in the slug at the beginning of the disinfection process, as the slug moves through the watermain, and at the point of discharge. If the chlorine concentration decreases by more than 25 mg/L at any of the sampling points, the flow shall be stopped and additional chlorine shall be added to restore the chlorine concentration in the slug to not less than its original concentration.

Table 1: Chlorine Concentrations* and Contact Times for Disinfecting New Watermains

Disinfection Method	Minimum Contact Time	Initial Chlorine Concentration	Maximum Allowable Decrease in Chlorine Concentration
Tablet or Continuous Feed	24 hours	≥ 25 mg/L	40% of the Initial Chlorine Concentration to a maximum of 50 mg/L**
Slug	3 hours	≥ 100 mg/L	25 mg/L
Spray	30 minutes	≥ 200 mg/L	Measurement Not Required

* At concentrations over 10 mg/L, measurements of total chlorine and free chlorine shall be deemed equivalent.

** **Exception:** Where copper pipe is used as a watermain, disinfection shall be performed using the continuous feed method, with an initial chlorine concentration of ≥ 50 mg/L and a minimum 24-hour contact time. Due to the chlorine demand exerted by the copper, the maximum allowable decrease requirement in Table 1 does not apply, and the effectiveness of the disinfection process shall be demonstrated by the *Microbiological Sampling* referred to in Section 1.1.3.

The following examples are provided to demonstrate the proper use of Table 1.

Example 1

When using the Continuous Feed Disinfection Method with an initial chlorine concentration of 50 mg/L, the maximum allowable decrease in chlorine concentration is 40% of 50 mg/L, or 20 mg/L. Therefore, at least 30 mg/L of chlorine must be present after 24 hours.

Example 2

When using the Continuous Feed Disinfection Method with an initial chlorine concentration of 150 mg/L, the maximum allowable decrease in chlorine concentration is 50 mg/L, because 40% of 150 mg/L is greater than the maximum allowable decrease of 50 mg/L. Therefore, at least 100 mg/L of chlorine must be present after 24 hours.

Example 3

When using the Slug Disinfection Method, if the initial chlorine concentration in the slug is 150 mg/L, then the chlorine concentration must not decrease below 125 mg/L (a decrease of > 25 mg/L). If the chlorine concentration were to fall below 125 mg/L, the flow shall be stopped and chlorine added to restore the chlorine concentration to at least 150 mg/L.

1.1.3. Microbiological Samples for New Watermains

The Operating Authority shall ensure that the *Microbiological Samples* taken in accordance with ANSI/AWWA Standard C651 include as a minimum *Escherichia coli* and Total Coliforms and are tested by a licensed and accredited laboratory. When *Microbiological Samples* are taken from new watermains that have not been placed into service, Operating Authorities shall ensure that additional samples are taken at the same time from the same location and are tested immediately for:

- (a) free chlorine residual, if the system provides chlorination and does not provide chloramination; or
- (b) combined chlorine residual, if the system provides chloramination.

These *Microbiological Samples* and disinfectant residual tests are not considered *Drinking Water* tests for the purpose of the Safe Drinking Water Act (SDWA), and are, therefore, not reportable. Any person authorized by the owner or Operating Authority can collect *Microbiological Samples* from watermains that have not been placed into service and perform the associated disinfectant residual tests.

For new watermains with limited sampling points available, an alternative method of taking *Microbiological Samples* is called staged sampling. Staged sampling shall be performed as follows:

- A flow meter shall be installed to measure flow through the new watermain;
- A sampling point shall be installed at the end of the new watermain (additional sampling points may also be installed along the length of the watermain); and
- Flow shall be established, and samples shall be taken from the sampling point(s) at intervals that are calculated to represent the lengths of the watermain as required by

Sections 5.1.1.2 and 5.1.1.3 of ANSI/AWWA Standard C651, based on the pipe size and the measured flow rate.

Operating Authorities shall endeavour to maintain an *Acceptable Disinfectant Concentration* until the new watermain is placed into service. If a concentration of 0.05 mg/L of free chlorine residual in a chlorinated system (or 0.25 mg/L of combined chlorine residual in a chloraminated system) is not maintained prior to placing into service, the microbiological sampling shall be repeated.

1.1.4 Connecting New Watermains to the Existing System

The provisions outlined in Section 4.10 of ANSI/AWWA Standard C651 are mandatory, along with the additional requirements prescribed below. The *Backflow Prevention* provisions within Section 4.8.9 of ANSI/AWWA Standard C651 are not mandatory for *Connections*.

When *Microbiological Samples* are taken from *Connections*, Operating Authorities shall ensure that additional samples are taken at the same time from the same location and are tested immediately for,

- (a) free chlorine residual, if the system provides chlorination and does not provide chloramination; or
- (b) combined chlorine residual, if the system provides chloramination.

1.1.4.1 Connections Equal to or Less than One Pipe Length (Generally ≤ 6 m)

The Operating Authority shall ensure that *Connections* equal to or less than one pipe length (generally ≤ 6 m) are undertaken in accordance with Section 4.10.1 of ANSI/AWWA Standard C651 and that the *Connection* remain *Isolated* from the existing *Drinking Water System*, except while being flushed or sampled, until satisfactory results are received from one *Microbiological Sample*, taken by a *Certified Operator* or *Water Quality Analyst*, from water that has been directed through the *Connection*.

Exception: If a *Certified Operator* is present to witness the installation and disinfection of the *Connection* to ensure that the sanitary construction practices and disinfection requirements of Sections 4.10 and 4.10.1 of ANSI/AWWA Standard C651 were met, then the *Connection* can be placed into service with no *Microbiological Sample* required.

1.1.4.2 Connections Greater than One Pipe Length (Generally > 6 m)

Connections greater than one pipe length (generally > 6 m) shall be undertaken in accordance with Section 4.10.2 of ANSI/AWWA Standard C651.

Exception: The procedure described below may be used at the discretion of the Operating Authority for the installation and disinfection of *Connections* greater than one pipe length and up to a total length of 40 m if the *Connection*:

- a. Crosses a transportation corridor, the extended closure of which could result in significant community impacts (e.g., traffic congestion, loss of emergency vehicle access, safety concerns), or
- b. Cannot be constructed to within one pipe length of the existing watermain due to the potential for destabilizing an existing thrust block.

Procedure:

- The new watermain and *Appurtenances* forming the *Connection* shall be sprayed or hand swabbed with a minimum 1% sodium hypochlorite solution, aboveground or in the excavation, immediately prior to installation.
- A *Certified Operator* is required to witness the installation of the *Connection* to ensure that sanitary construction practices are followed, and proper disinfection is performed.
- The *Connection* shall remain *Isolated* from the existing *Drinking Water System*, except while being flushed or sampled, until satisfactory results are received from two *Microbiological Samples* taken by a *Certified Operator* or a *Water Quality Analyst* in accordance with Section 5.1.1.1 of ANSI/AWWA Standard C651.
- Where required by the Operating Authority, hydrostatic testing of the *Connection* shall not be undertaken against the isolating valve until satisfactory results from the *Microbiological Samples* referred to above are received. *Drinking Water* shall be used for hydrostatic testing.

Figure B-1 in Appendix B provides an example to help understand this exception.

1.1.4.3 Placing New Watermains into Service

Valves opened to place a new watermain into service shall, in all cases, be operated by a *Certified Operator*. As part of placing a watermain into service, *Flushing* through the *Connection* shall be performed until a *Certified Operator* or a *Water Quality Analyst* verifies that an *Acceptable Disinfectant Concentration* is present in the new watermain. If *Microbiological Samples* are taken and/or disinfectant residual tests are performed after a watermain is placed into service, they are considered as *Drinking Water* tests for the purpose of the SDWA and adverse test results are reportable.

1.2. Relining of Watermains

For relining of existing watermains, the conditions of Sections 1.1.2, 1.1.3 and 1.1.4 of this procedure will apply.

Exception: The Operating Authority may allow return to service prior to receiving all satisfactory *Microbiological Sample* results if all the following conditions are met:

- The watermain is physically *Isolated* from the remainder of the *Drinking Water System* through *Backflow Prevention*;
- The local Medical Officer of Health is consulted prior to the commencement of the project and their advice is documented and followed; and
- *Flushing* of the watermain has been completed and an *Acceptable Disinfectant Concentration* has been restored.

1.3. Planned Watermain Inspection and Cleaning

All equipment used for the inspection of watermains shall be dedicated for that purpose only, and shall be suitable for disinfection. Sanitary practices shall be followed to prevent the introduction of *Contaminants* into the watermain. All inspection equipment inserted into a watermain (e.g., electromagnetic, acoustic, or video inspection equipment) shall be cleaned and disinfected using a minimum 1% sodium hypochlorite solution immediately prior to insertion. *Drinking Water* shall be used for equipment cleaning and/or preparation of hypochlorite solutions. Disinfectant residual testing shall be performed upon removal of the inspection equipment. *Flushing* shall be performed if an *Acceptable Disinfectant Concentration* was not maintained.

For planned watermain cleaning by swabbing or *Higher Velocity Flushing*, the system can be returned to normal service, defined as having all valves returned to normal operating position, after an *Acceptable Disinfectant Concentration* is achieved at the point of flushing.

For all other types of cleaning (e.g., air scouring, ice pigging, etc.), the Operating Authority shall develop and implement a site-specific plan for cleaning, disinfection, and sampling in agreement with the local *Ministry* office in consultation with the local Medical Officer of Health.

1.4. Planned Maintenance of Appurtenances and Fittings

Section 2 of this procedure for Category 1 watermain breaks shall apply to the installation/replacement/repair of *Appurtenances* and/or fittings. If *Contamination* is evident or suspected, the procedures prescribed under Section 2 of this procedure for Category 2 watermain breaks shall apply.

1.5. Tapping of Watermains

Where existing watermains are tapped, the pipe surface at the location of the tap shall be cleaned and disinfected using a minimum 1% sodium hypochlorite solution. Where applicable, the drill/cutting/tapping bits and all surfaces of mainstops, service saddles, tapping sleeves and valves which will come into contact with *Drinking Water* shall likewise be cleaned and disinfected using a minimum 1% sodium hypochlorite solution immediately prior to installation. If any of the disinfected surfaces come into contact with the soil and/or water in the excavation prior to use, the cleaning and disinfection procedure shall be repeated.

The live tapping (i.e., “wet” tapping) of a watermain that is part of the *Drinking Water System* must be performed by a *Certified Operator*; however, a person or contractor who is not a *Certified Operator* may perform wet taps provided they are being *Directly Supervised* by a *Certified Operator*. The Operating Authority shall maintain records of the name of the *Certified Operator* present for the wet taps.

1.6. Service Pipes

Service Pipes of 100 mm diameter and greater shall be considered as watermains for the purposes of this procedure and shall be disinfected and tested in accordance with the requirements of ANSI/AWWA Standard C651 as modified by this procedure. For *Service Pipes* of diameter less than 100 mm, Operating Authorities shall ensure that sanitary conditions are maintained during installation/repair, and that *Flushing* is conducted before they are placed into service.

1.7 Return to Service of Watermains *Isolated* from the Distribution System

Where a section of watermain has been *Isolated* from a *Drinking Water System* and a concentration of 0.05 mg/L of free chlorine residual in a chlorinated system (or 0.25 mg/L of combined chlorine residual in a chloraminated system) was not maintained within the *Isolated* section (e.g., a valved-off stub), the Operating Authority shall develop and implement a re-commissioning plan that reflects the duration of isolation and the associated risks. The plan may include the implementation of Sections 1.1.2, 1.1.3, and/or 1.1.4 of this procedure. At a minimum, the plan must include:

- *Flushing* through the *Isolated* section of watermain; and
- Satisfactory test results to be received from at least one *Microbiological Sample* prior to the *Isolated* watermain being placed into service.

The Operating Authority shall keep a copy of the re-commissioning plan and maintain records showing that all items required by the re-commissioning plan were satisfactorily completed.

2. Watermain Disinfection Procedures for Emergency Repairs

This procedure uses a risk management approach to categorize watermain breaks based on the potential for *Contamination*. The objective of this procedure is to set minimum disinfection requirements to minimize the potential for *Drinking Water Health Hazards* during emergency/unplanned repairs resulting from the physical failure of a watermain and/or *Appurtenance* (a “watermain break”).

2.1. Categorization and Public Agency Notification of Watermain Breaks

All watermain breaks shall be classified as Category 2 as per Section 2.1.2 of this procedure unless an *Operator-in-Charge* (OIC) conducts a visual inspection upon completion of the excavation to determine the nature of the watermain break and classifies it as a Category 1 as per Section 2.1.1.

The OIC shall assess the evidence of *Contamination* or suspected *Contamination* of the watermain throughout the repair procedure and shall reclassify if required.

Refer to Appendices C (flowchart) and D (pictures) to better understand the criteria for categorizing watermain breaks.

2.1.1. Category 1

An OIC may classify watermain breaks with no evident or suspected *Contamination* as Category 1. The steps described in Sections 2.2 and 2.3 of this procedure shall be followed for Category 1 watermain break repairs.

Contamination is typically not suspected for circumferential breaks or small leaks where flow is maintained from the break until an *Air Gap* is established and where the *Air Gap* is maintained during the repair procedure. If, at any time, *Contamination* is evident or suspected, the watermain break shall be reclassified as Category 2.

2.1.2. Category 2

Watermain breaks with evident or suspected *Contamination* shall remain classified as Category 2. Watermain repairs involving more than one pipe length (generally ≥ 6 m) of replaced pipe are also classified as Category 2. The steps described in Sections 2.2 and 2.4 of this procedure shall be followed for Category 2 watermain break repairs.

2.1.3. Public Agency Notification

2.1.3.1. Category 1

Category 1 watermain breaks are not deemed to be observations of improper disinfection in accordance with Section 16-4 of Schedule 16 of O. Reg. 170/03, and are not reportable to the Spills Action Centre.

This procedure does not require that the local Medical Officer of Health be notified of Category 1 watermain break repairs; however, the local Medical Officer of Health may exercise their option to require such notification. Operating Authorities may choose to provide notification to, or seek advice from, the local Medical Officer of Health at any time.

2.1.3.2. Category 2

Category 2 watermain breaks are not reportable unless an Operating Authority believes that contaminated water was directed to users. If an Operating Authority believes that contaminated water was directed to users, this will constitute an observation of improper disinfection in accordance with Section 16-4 of Schedule 16 of O. Reg. 170/03, and the

reporting and corrective actions of Schedule 16 and the applicable Schedule 17 or 18 of O. Reg. 170/03 shall apply.

This procedure does not require that the local Medical Officer of Health be notified of Category 2 watermain break repairs unless an observation of improper disinfection has been reported as noted above; however, the local Medical Officer of Health may exercise their option to require such notification. Operating Authorities may choose to provide notification to, or seek advice from, the local Medical Officer of Health at any time.

Notification to the local Ministry office is not required for Category 2 watermain breaks however if a Water Advisory is declared or a watermain break is assessed to be a Special Case as described in sections 2.4.4 and 2.4.5, the Operating Authority shall verbally notify the Ministry as soon as reasonably possible by speaking in person or on the telephone with a person. The notification shall be made to the Spills Action Centre during and after business hours.

2.2. Watermain Break Disinfection Procedure Common to Categories 1 and 2

The following steps must be performed for all emergency watermain repairs (Category 1 and Category 2). Examples of typical steps for Category 1, 2 and special cases are provided in Appendices E, F and G of this procedure, respectively.

2.2.1. Maintenance of Flow

The Operating Authority shall determine if flow can be maintained to the watermain break site until the watermain is excavated. This determination shall be based on risks to worker and public safety, the possibility of property damage, and/or adverse impact to the natural environment.

The Operating Authority will attempt to maintain flow from the watermain break, where possible, until an *Air Gap* is established. Flow may be reduced by throttling valves while maintaining sufficient flow from the watermain break to minimize the potential for *Contamination*. Flow may be discontinued after an *Air Gap* has been created.

If flow from the watermain break is not maintained before an *Air Gap* is established, the watermain break shall remain Category 2.

2.2.2. Excavation Dewatering

Excavation dewatering shall be continued for the duration of the repairs such that the *Air Gap* between the location of the watermain break and the water in the excavation is maintained. If the water level in the excavation rises such that the *Air Gap* is not maintained after flow from the watermain break has been discontinued, then the watermain break shall be classified as Category 2.

2.2.3. Disinfection of Pipe and Repair Parts

All surfaces of pipe and repair parts which will come into contact with *Drinking Water* shall be disinfected using a minimum 1% sodium hypochlorite solution immediately prior to installation. If any of the disinfected surfaces come into contact with the water and/or soil in the excavation prior to installation, the surfaces shall be cleaned and the disinfection procedure shall be repeated.

If cutting out a section of pipe, the interior surfaces of the cut ends of the existing watermain shall be disinfected using a minimum 1% sodium hypochlorite solution, swabbed or sprayed as far as can be practically reached.

2.2.4. Installation of Repair Parts

The repair parts shall be installed while ensuring that *Contaminants* do not enter the watermain.

2.2.5. Post-Repair *Flushing* and Return to Normal Service

Flushing shall be conducted following repairs by creating a temporary dead end downstream of the watermain break through valve operation, and *Flushing* through the location of the repair to a discharge point. Flushed water may be discharged from a hydrant, plumbing or *Appurtenances*. Where there is no discharge point to allow for *Flushing*, the Operating Authority shall tap the watermain on the downstream side of the watermain break and discharge from that point.

Flushing shall continue until the discharged water is visibly free from discoloration and particulates, and an *Acceptable Disinfectant Concentration* has been restored; whereupon the system can be returned to normal service, defined as having all valves returned to normal operating position.

Exception: Where the repair was performed using a repair sleeve and flow was maintained from the watermain break until an *Air Gap* was established, *Flushing* is not required.

Dechlorination is required for any water that is directly discharged into surface water or if the discharge into the natural environment is likely to cause an adverse effect, as per Condition 10.0 of Schedule B of the Municipal Drinking Water Licence. The discharged water is deemed to be a Class II spill for the purposes of O. Reg. 675/98 (Classification and Exemption of Spills and Reporting of Discharges) made under the Environmental Protection Act. Discharges of flushed water are also regulated under Condition 5.5 of Schedule C of the Municipal Drinking Water Licence.

2.3. Additional Information for Category 1 Watermain Break Repairs

2.3.1. Microbiological Samples (Optional)

There is no requirement for *Microbiological Samples* to be taken following Category 1 watermain break repairs. Where the Operating Authority chooses to perform *Microbiological Sampling*, the samples shall be deemed *Drinking Water* samples within the meaning of O. Reg. 170/03, and the reporting/corrective actions of Schedule 16 and the applicable Schedule 17 or 18 of O. Reg. 170/03 shall apply.

2.4. Additional Requirements for Category 2 Watermain Break Repairs

In addition to the requirements described in Section 2.2 of this procedure, the following steps are required for Category 2 watermain break repairs.

2.4.1. Removal of Contaminants from Watermain

Appropriate additional steps shall be undertaken to remove *Contaminants* from the watermain, such as:

- Physical removal of *Contaminants*;
- *Flushing* into the excavation;
- *Higher Velocity Flushing* after repairs where practical and feasible.

2.4.2. Additional Disinfection Procedures

In addition to the steps in Section 2.2.3 of this procedure, site-specific disinfection procedures may also be used depending on the severity or nature of the *Contamination*. The steps may include the disinfection procedures for new watermains as per ANSI/AWWA Standard C651.

2.4.3. Microbiological Samples (Mandatory)

After the completion of *Flushing*, at least one *Microbiological Sample* shall be taken and submitted as soon as reasonably possible, taking into consideration laboratory working hours and transportation timeframes.

The flow shall be directed to ensure that the sample represents water that has passed through the location of the repair. The sampling will typically occur at the point of *Flushing*, and may take place from sampling ports, hydrants, blow-offs, or premise plumbing. All samples shall be considered *Drinking Water* samples, taken and tested in accordance with O. Reg. 170/03 requirements. The reporting and corrective actions of Schedule 16 and the applicable Schedule 17 or 18 of O. Reg. 170/03 shall apply.

The watermain may be returned to normal service, defined as having all valves returned to normal operating position, prior to receipt of *Microbiological Sample* results.

2.4.4. Special Case - Sewage Contamination

If there is evident or suspected sewage *Contamination* of a watermain, in addition to the steps in Sections 2.2 and 2.4 of this procedure, the Operating Authority shall develop and implement a plan with site-specific procedures for disinfection and sampling. The sampling plan shall include as a minimum taking two sets of *Microbiological Samples* at least 24 hours apart.

Return to normal service is contingent upon the corrective actions and sampling plan being completed to the satisfaction of the local *Ministry* office (in consultation with local Medical Officer of Health). The affected watermain(s) may not be placed into service before the corrective actions and sampling plan are completed unless a *Water Advisory* is declared.

The disinfection requirements for new watermains as per Section 1.1.2 of this procedure may be used based on agreement between the Operating Authority and the local *Ministry* office, in consultation with the local Medical Officer of Health.

2.4.5. Special Case – Chemical Contamination

If there is evident or suspected chemical *Contamination* of a watermain, in addition to the steps in Sections 2.2 and 2.4 of this procedure, the Operating Authority shall develop and implement a plan with site-specific procedures for disinfection and/or decontamination and sampling. The Operating Authority shall finalize the plan in agreement with the local *Ministry* office, in consultation with the local Medical Officer of Health.

Return to normal service is contingent upon the corrective actions and sampling plan being completed to the satisfaction of the local *Ministry* office, in consultation with the local Medical Officer of Health. The affected watermain(s) may not be put back in service before the corrective actions and sampling plan are completed unless a *Water Advisory* is declared.

3. Documentation

3.1. Documentation for New Watermains

When installing new watermains as per Section 1.1 of this procedure, the Operating Authority shall maintain records of the following information as a minimum. The information shall be retained as per the record-keeping requirements of Section 27 of O. Reg. 128/04. This section does not require that all of the information be recorded on a single form:

- *Backflow Prevention:*
 - Air gap (as defined in CSA Standard B64.10 “Selection and Installation of Backflow Preventers) or Reduced Pressure Principle Backflow Preventer installed as per Section 4.8.9 of ANSI/AWWA Standard C651; and
 - Backflow preventer tested as per Section 1.1.1 of this procedure.

- Pre-disinfection swabbing and/or flushing have been completed.
- Disinfection Process:
 - Method of disinfection;
 - Disinfection chemical meets the requirements of both the AWWA and NSF/ANSI/CAN 60 Standards.
 - Date and time disinfection started and ended;
 - Chlorine concentration at start and end of contact time at each sampling point; and
 - Decrease in chlorine concentration in mg/L and/or percentage as applicable.
- *Microbiological Sampling* referred to in Section 1.1.3:
 - Schematic or drawing showing approximate location where *Microbiological Samples* were taken;
 - *Microbiological* and disinfectant residual sample results; and
 - For staged sampling: flow rate, time each sample was taken and calculated length.
- *Connections* referred to in Section 1.1.4:
 - Length of *Connection*;
 - Confirmation whether sanitary construction practices were followed;
 - Confirmation that proper disinfection was performed;
 - Name of *Certified Operator* present for the installation of the *Connection* if required;
 - Results of *Microbiological* and disinfectant residual samples if required;
 - Reason for using the exception under s. 1.1.4.2 (if used);
 - Disinfectant residual after watermain is flushed and put in service; and
 - Date and time watermain was placed into service.

3.2. Documentation for Watermain Maintenance and Repair

When performing maintenance and repair activities as per Sections 1.4 and 2 of this procedure, the Operating Authority shall maintain records of the following information as a minimum. The information shall be retained as per the record-keeping requirements of Section 27 of O. Reg. 128/04. This section does not require that all of the information be recorded on a single form:

- Date.
- Location (e.g., a municipal address).
- Flow maintained at the site until *Air Gap* created.
- Watermain size and material (e.g., 150 mm cast iron).
- No evident or suspected *Contamination* of the watermain was observed before or during the repair process.
- If watermain break, indicate type of watermain break (e.g., circumferential, longitudinal, split bell, spiral, rupture, blow-out, hole, leak at main stops/tapping valves, etc.).
- If planned maintenance, indicate type of planned maintenance (e.g., valve replacement)
- *Air Gap* maintained, once established, throughout the repair process.
- Name of *Operator-in-Charge* who classified the watermain break as Category 1 (if applicable).
- Type of repair (e.g., clamp, cut out, etc.).
- Pipe and repair parts disinfected.
- Post-repair *Flushing* undertaken (if applicable).

- For Category 2, where additional steps were required under 2.4.1 and 2.4.2, describe these steps.
- For Category 2 – Special Cases, include site-specific plan. If chlorine disinfection was used, indicate initial concentration, contact time, final concentration and final concentration as percentage of initial concentration.
- Disinfectant residual following final post-repair *Flushing*. If final disinfectant residual is less than 0.2 mg/L free chlorine in a chlorinated system or 1.0 mg/L combined chlorine in a chloraminated system, then provide the location and results of upstream disinfectant residual(s) or documented benchmarks for the area.
- *Microbiological Samples* taken (If applicable).
 - Date and location(s) of sample(s) (e.g., Chain of custody).
- Date and time of return to normal service.
- *Water Advisory* declared (if applicable): Date and Time.
- Public Agency Notification (if applicable): local *Ministry* office (Date and Time).
- Public Agency Notification (if applicable): Spills Action Centre (Date and Time).
- Public Agency Notification/Direction (if applicable): local Medical Officer of Health (Date and Time).

APPENDIX A

Examples of Reduced Pressure Principle Backflow Preventer Installations



Figure A-1: Temporary connection from a hydrant with *Backflow Prevention* using a CSA-certified reduced pressure principle backflow preventer.



Figure A-2: Temporary connection from a watermain with *Backflow Prevention* using a CSA-certified reduced pressure principle backflow preventer.

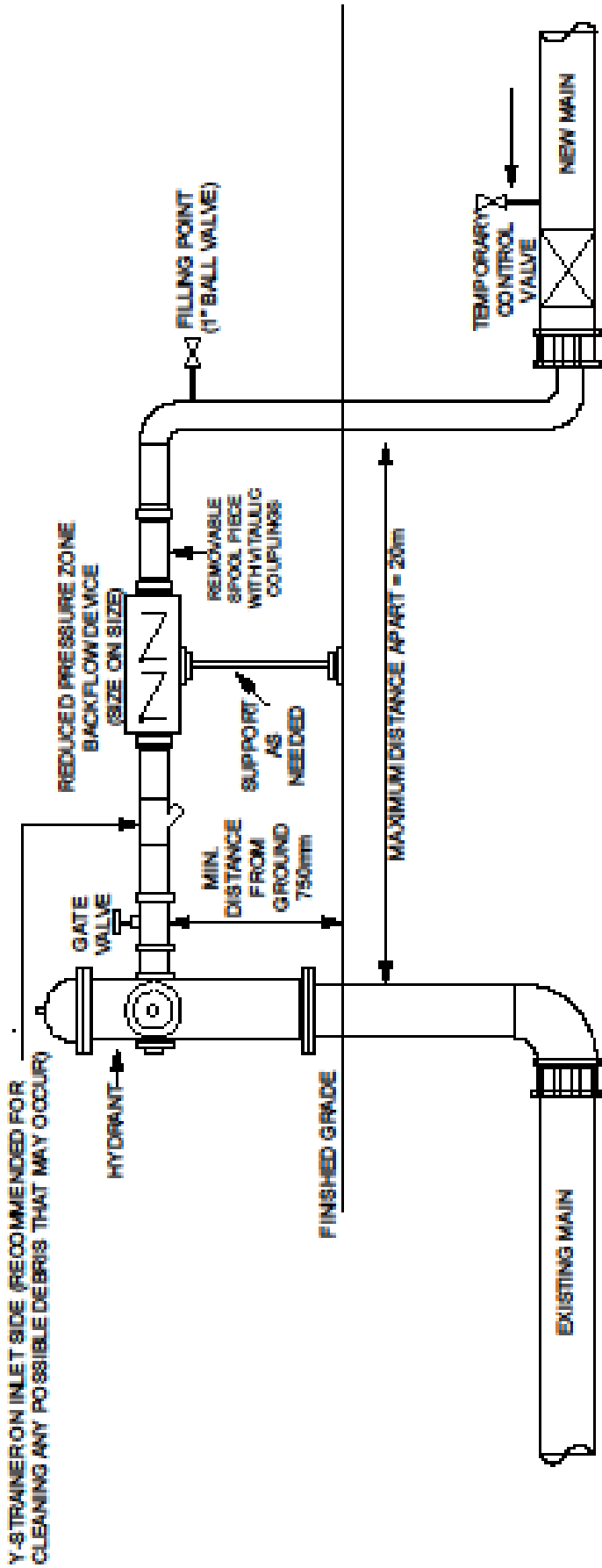


Figure A-3: Schematic of temporary connection from hydrant with Backflow Prevention using a CSA-certified reduced pressure principle backflow preventer.

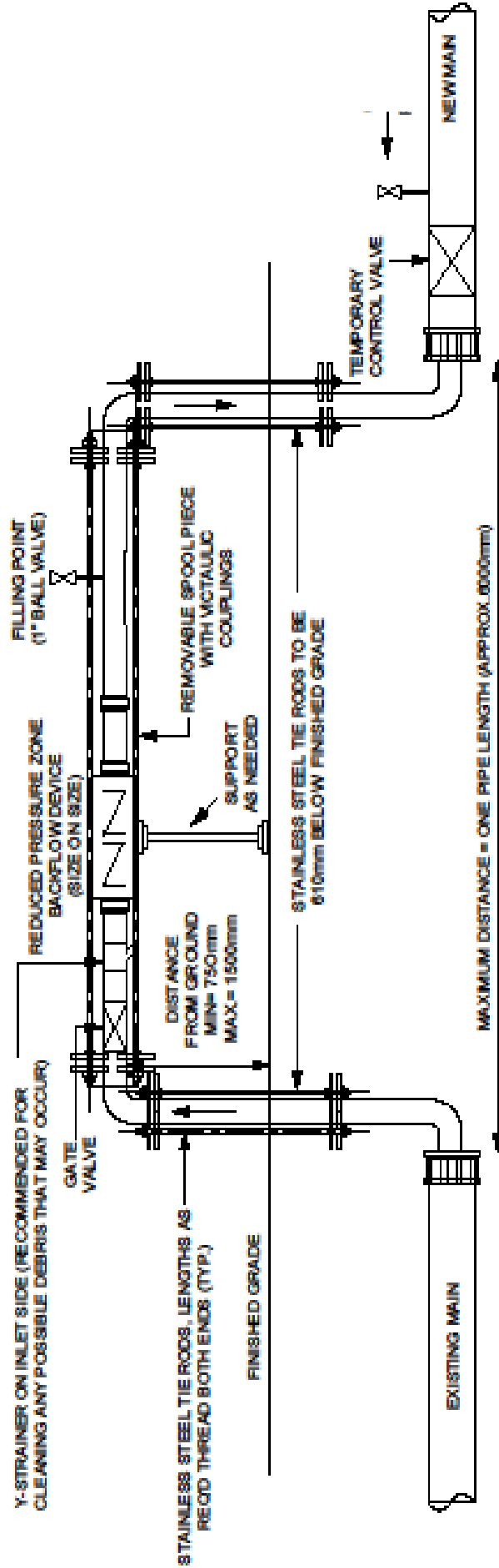


Figure A-4: Schematic of temporary connection from watermain with *Backflow Prevention* using a CSA-certified reduced pressure principle backflow preventer.

APPENDIX B

1.1.4.2 Exception for *Connections Greater than One Pipe Length*

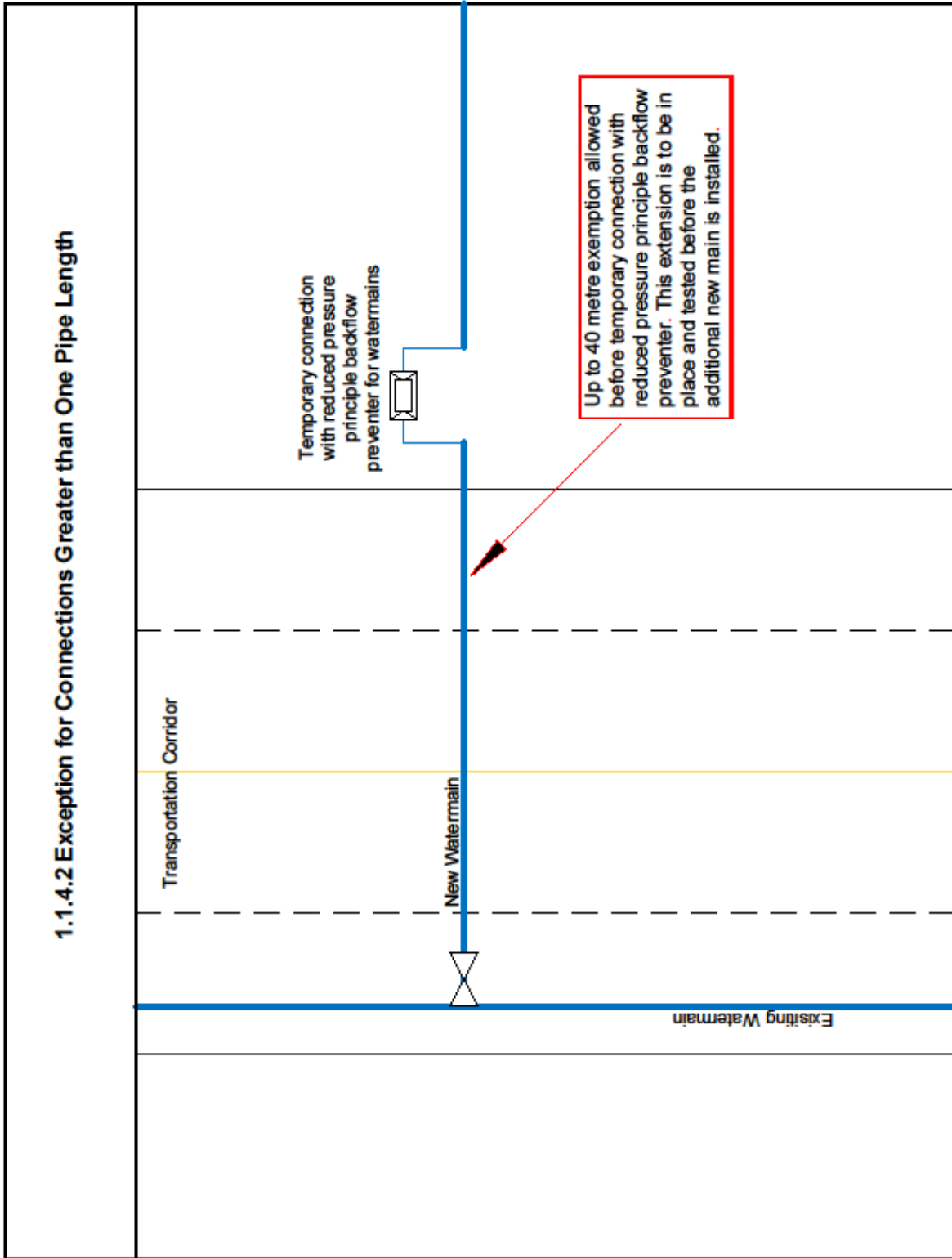
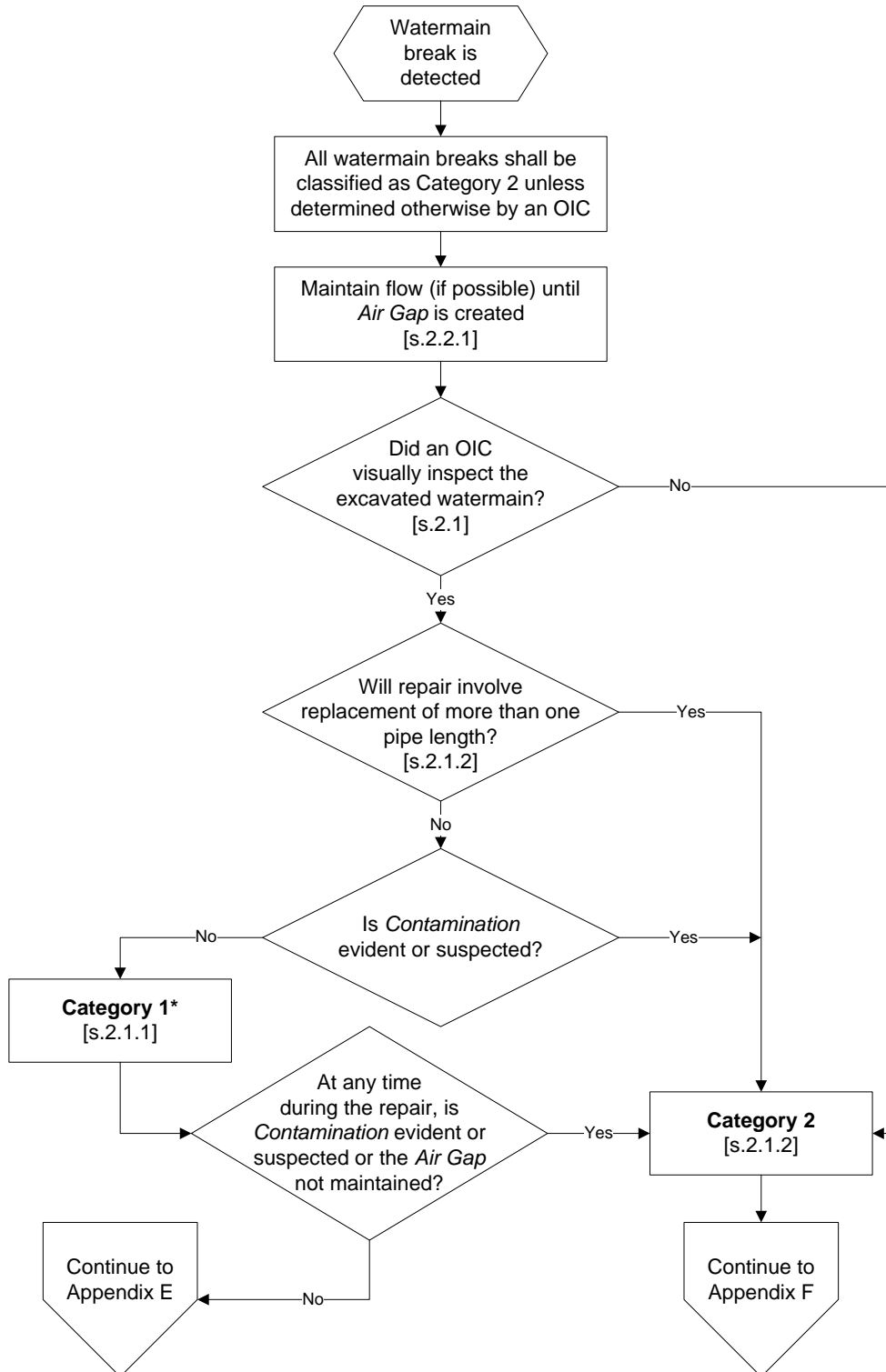


Figure B-1: Example of Exception in Section 1.1.4.2.

APPENDIX C

Tools to Help Determine the Category of Watermain Break - Flowchart

The following flowchart will help determine the categories of watermain breaks.



*An OIC must remain on-site throughout a Category 1 repair to assess the evidence of Contamination or suspected Contamination. If an OIC cannot be present for the duration of the repair, the watermain break shall remain as a Category 2.

APPENDIX D

Tools to Help Determine the Category of Watermain Break - Pictures

Examples of watermain breaks that are typical of Category 1 are included below for illustrative purposes only:



Figure D-1: Circumferential watermain break with flow maintained until after an *Air Gap* was established.



Figure D-2: Corrosion hole leak in a watermain with flow maintained until after an *Air Gap* was established.

Examples of watermain breaks that are typical of Category 2 are included below for illustrative purposes only:



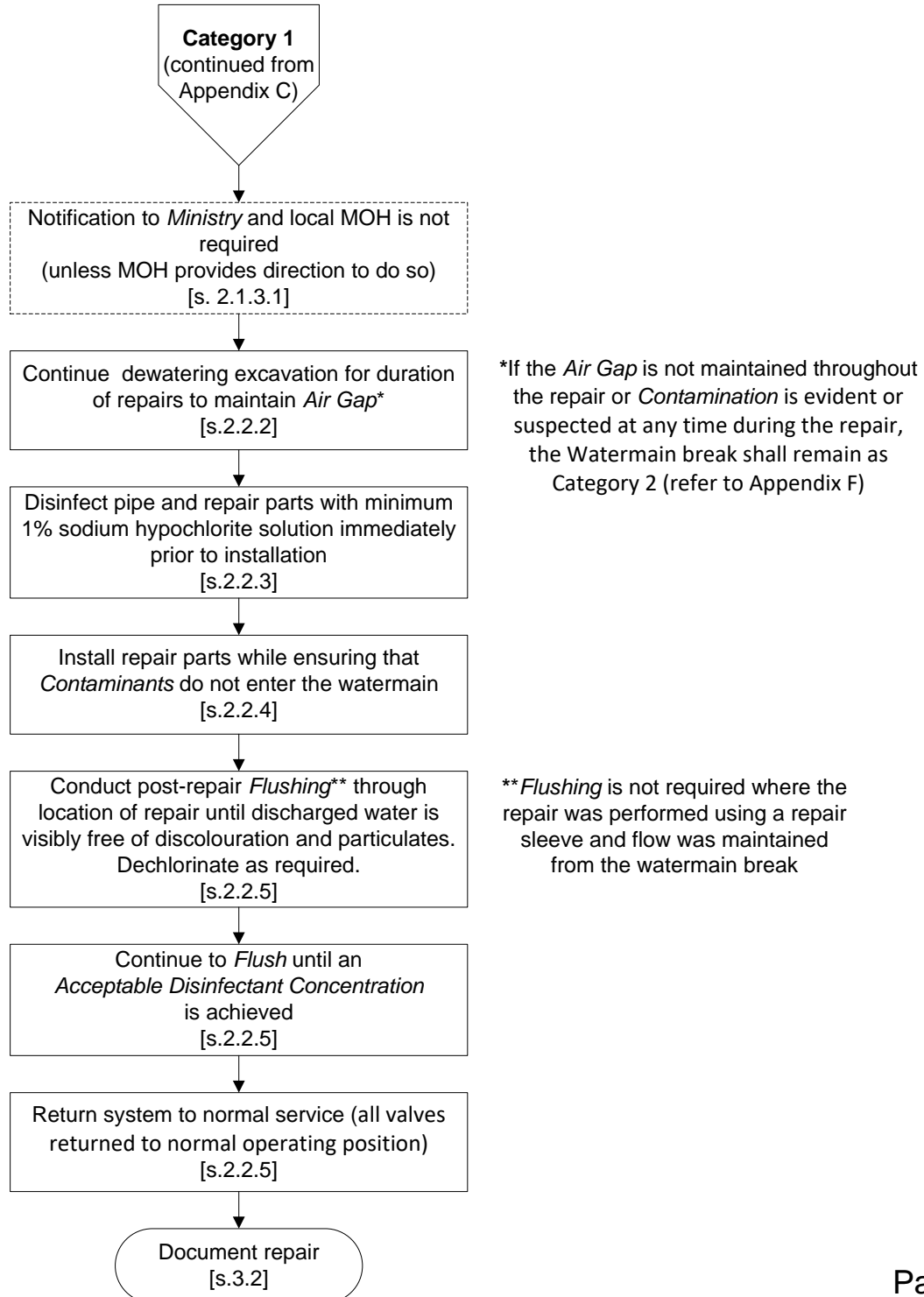
Figure D-3: Longitudinal watermain break with evident *Contamination*.



Figure D-4: Spiral watermain break with evident *Contamination*.

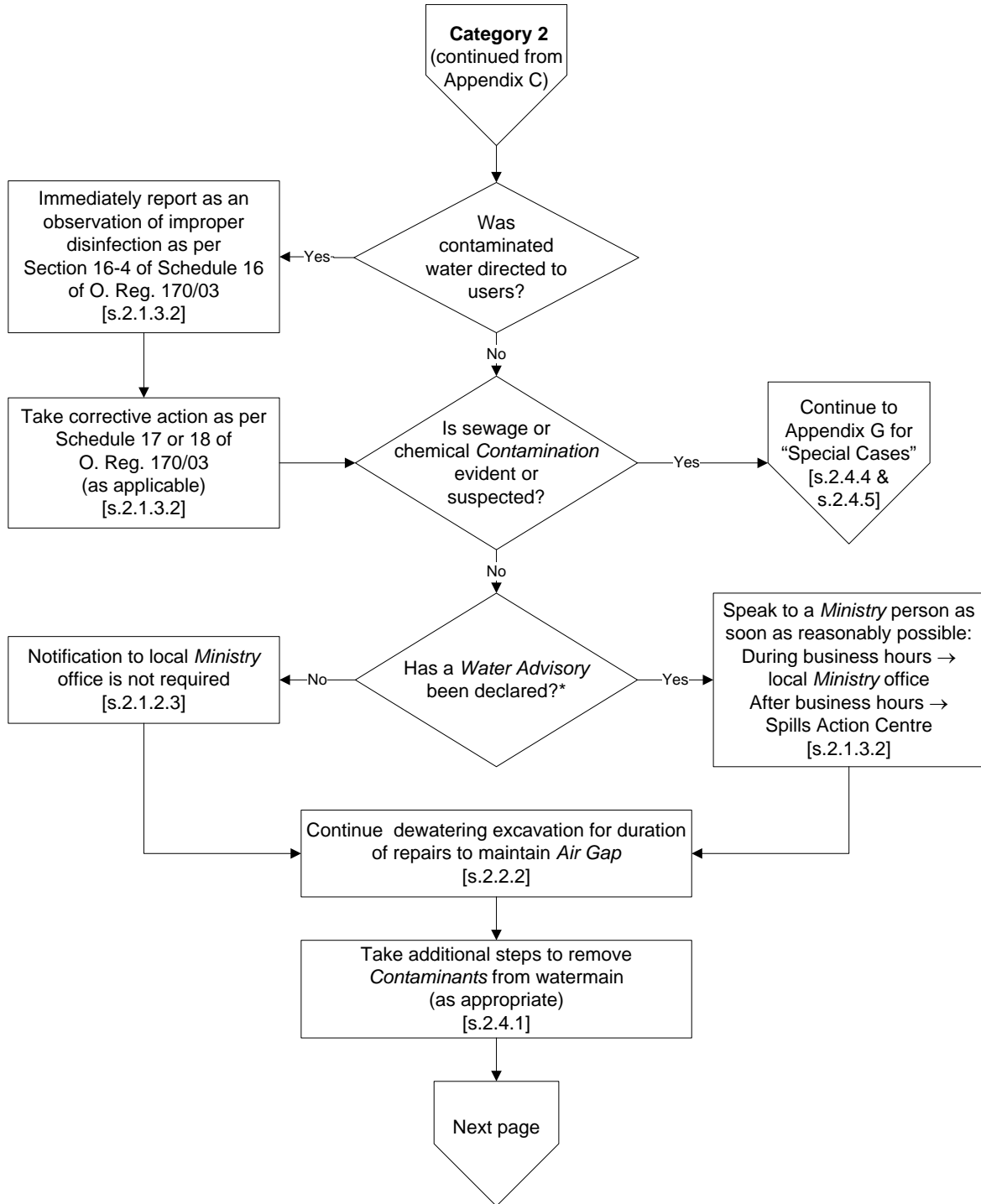
APPENDIX E – CATEGORY 1 FLOWCHART

The following flowchart is an example of the typical steps required for **Category 1** watermain breaks
Note: These steps also apply to the planned maintenance of watermain *Appurtenances* and fittings (refer to Section 1.4). Any additional directions given by the *Ministry* and/or the local Medical Officer of Health must be followed.

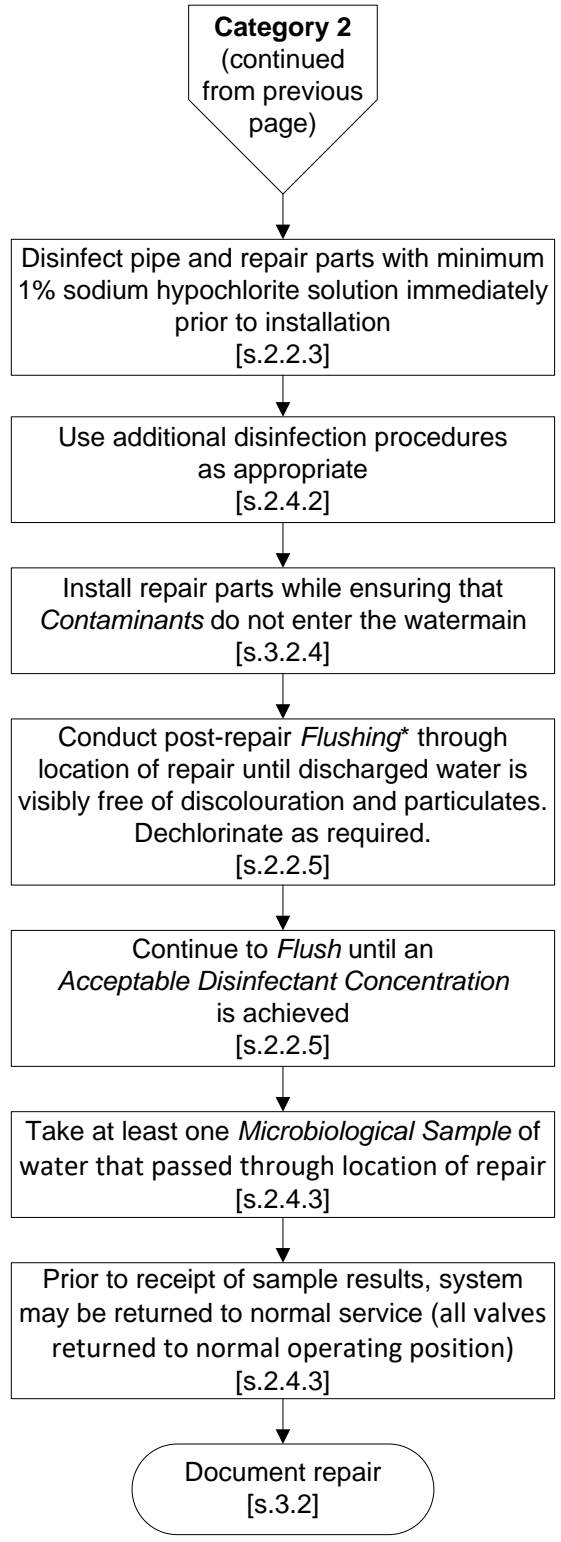


APPENDIX F - CATEGORY 2 FLOWCHARTS

The following flowchart is an example of the typical steps required for **Category 2** watermain breaks. **Note:** The sequence of actions may be varied as appropriate for the specific situation. Any additional directions given by the *Ministry* and/or the local Medical Officer of Health must be followed.



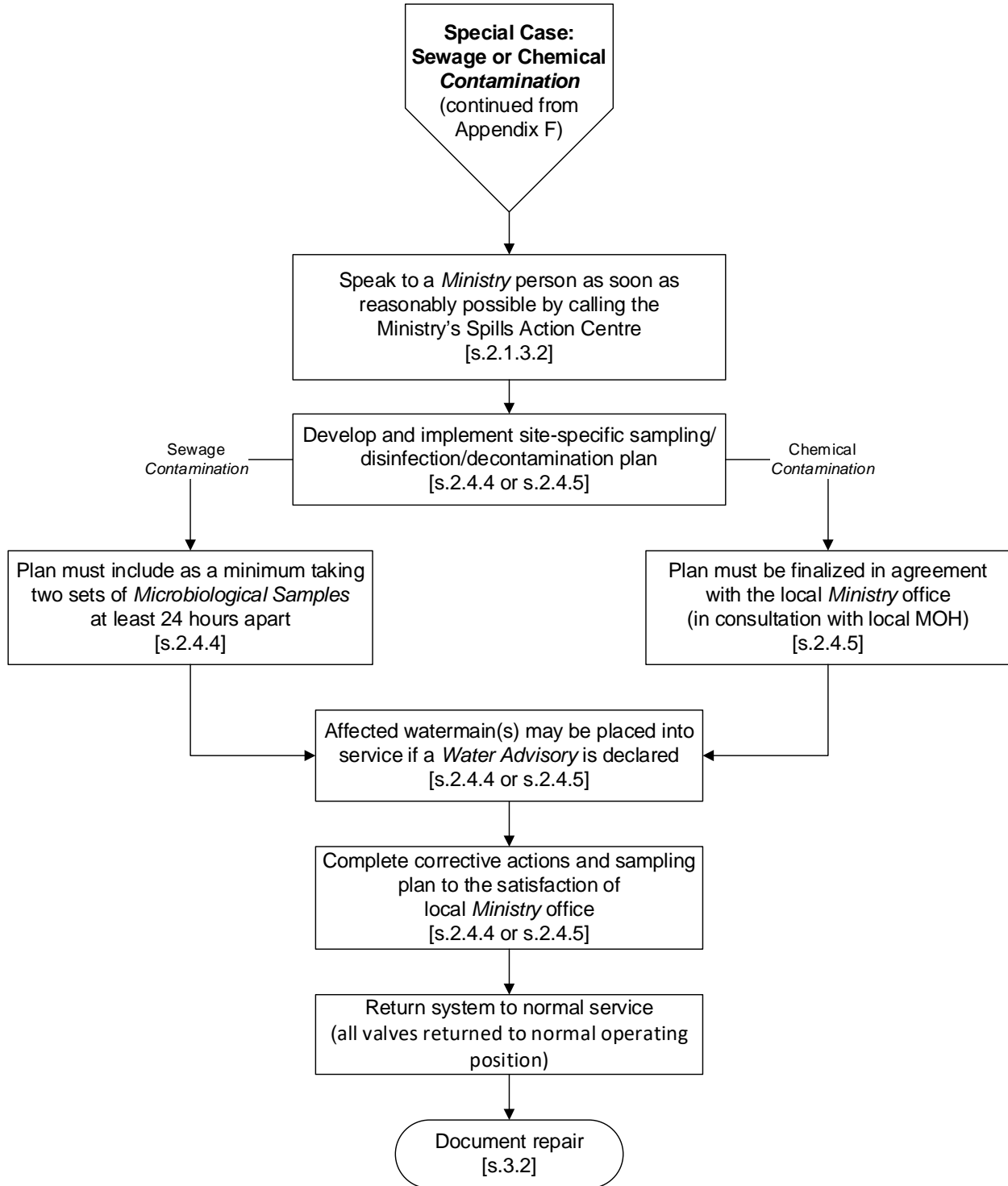
*Local MOH may exercise their option to require notification for all Category 2 watermain breaks



**Flushing* is not required where the repair was performed using a repair sleeve and flow was maintained from the watermain break

APPENDIX G - SPECIAL CASE FLOWCHART

The following flowchart depicts the requirements for special case *Contamination* (sewage or chemical) as a result of a watermain break.



APPENDIX H

Definitions

In this procedure,

“Acceptable Disinfectant Concentration” means:

- a) a disinfectant concentration of at least 0.2 mg/L free chlorine residual in a chlorinated system or 1.0 mg/L combined chlorine residual in a chloraminated system; or, if these disinfectant concentrations cannot be achieved,
- b) a disinfectant concentration that is representative of the residual in the area, determined by testing upstream and downstream from the testing location or by using documented benchmarks for the area, as long as free chlorine concentrations are at least 0.05 mg/L in a chlorinated system and combined chlorine concentrations are at least 0.25 mg/L in a chloraminated system.

“Air Gap” means a space at the location of the maintenance/repair between the exterior surface of the watermain and the interior surfaces of the excavation, including the water in the excavation, sufficient to prevent water, soil or any other *Contaminant* in the excavation from contacting the watermain, fittings, or *Appurtenances* throughout the maintenance/repair process.

“Appurtenance” means an appurtenance, within the meaning of O. Reg. 170/03, which is in contact with the *Drinking Water*.

“Backflow Prevention” means the prevention of a reversal of normal flow that could introduce *Contamination* to the *Drinking Water System*.

“Certified Operator” means certified operator within the meaning of O. Reg. 170/03.

“Connection” means all watermain and *Appurtenances* installed between an existing watermain and a new or future watermain/*Appurtenance*.

“Contaminant” means foreign matter that is not intended to enter a watermain.

“Contamination” means the introduction of a *Contaminant* into a watermain.

“Directly Supervised” means directly supervised within the meaning of Section 5.1.1 of the Certification Guide for Operators and Water Quality Analysts of Drinking Water Systems, as amended, but it does not expressly refer to the definition of supervisor under the Occupational Health and Safety Act.

“Drinking Water” means drinking water within the meaning of the Safe Drinking Water Act.

“Drinking Water Health Hazard” means drinking water health hazard within the meaning of the Safe Drinking Water Act.

“Drinking Water System” means drinking water system within the meaning of the Safe Drinking Water Act.

“Flushing” means flowing water through a section of watermain/appurtenances and out of the system until the water appears visibly free from discoloration and particulates with an *Acceptable Disinfectant Concentration*. This definition does not include recharging a watermain.

“Higher Velocity Flushing” means flushing of a watermain with sufficient velocity to discharge settled materials.

“Isolate” means operate valves to ensure that there is no flow of water to or from a specific section of watermain.

“Microbiological Samples” means water samples taken and tested for *Escherichia coli* and Total Coliforms by a licensed and accredited laboratory.

“Ministry” means the Ministry of the Environment, Conservation and Parks.

“Operator-in-Charge” means an operator-in-charge within the meaning of O. Reg. 128/04.

“Service Pipe” means a service pipe within the meaning of O. Reg. 170/03.

“Water Advisory” means a boil or drinking water advisory for the area being serviced by the affected watermains declared by the local Medical Officer of Health.

“Water Quality Analyst” means a water quality analyst within the meaning of O. Reg. 128/04.

**Ministry of the Environment,
Conservation and Parks**

**Ministère de l'Environnement, de la
Protection de la nature et des Parcs**

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August 4, 2020

Municipal Drinking Water System Owners/Operators,

The Ministry of the Environment, Conservation and Parks has released an updated version of its Watermain Disinfection Procedure, dated August 1, 2020. The procedure is referenced in Schedule B of Municipal Drinking Water Works Permits (typically condition 2.3) and must be followed where parts of the drinking water system are added, modified, replaced or extended, unless the Director has approved a different disinfection procedure that is specific to the system.

The Ministry expects drinking water systems to begin using the new procedure based on timelines identified within their Permit.

Permits Specifying Timelines for Transition

If the Municipal Drinking Water Licence for your system was renewed in 2019 or 2020, your Permit likely includes a condition (typically condition 2.3) that requires using any updated version of the ministry's Watermain Disinfection Procedure within six-months from its date of publication. As the new procedure was released on August 1, 2020, its use is required by February 1, 2020. The previous procedure is to be used until that date, unless the drinking water system receives approval from the ministry to use of the updated procedure earlier.

Permits that Do Not Specify Timelines for Transition

If your Permit does not already include a condition (typically condition 2.3) that requires using the updated version of the ministry's Watermain Disinfection Procedure, this condition will be added when the Municipal Drinking Water licence for your system is renewed. The November 2015 version of the procedure is to be used until the drinking water system's Permit is updated with the new condition at licence renewal, unless the system receives approval from the ministry to use the updated procedure earlier. The updated condition will require the drinking water system to use the updated version of the procedure six-months from the date the renewed licence is issued.

Request for Early Implementation of the Updated Watermain Disinfection Procedure

The ministry is encouraging early implementation of the updated procedure as it eliminates the need to apply for relief in certain situations when disinfecting watermains. To implement the August 1, 2020 procedure prior to the date required by conditions in your Permit, you should submit the attached one-page request to MDWLP@Ontario.ca

If you have any questions about the updated Watermain Disinfection Procedure or concerns about the transition timeline for your system, please email MDWLP@Ontario.ca.

Thank you,

Aziz Ahmed, P. Eng.

Director, Part V, Safe Drinking Water Act, 2002

Watermain Disinfection Procedure Questions and Answers - August 1, 2020

Overview	1
Preface	4
Section 1	Addition, Modification, Replacement, Extension and Planned Maintenance	5
Section 2	Watermain Disinfection Procedures for Emergency Repairs	12
Section 3	Documentation	16

Overview

Why was the Watermain Disinfection Procedure updated?

- Ontario’s Watermain Disinfection Procedure (WDP), first published in 2015, replaced the American Water Works Association (AWWA) Standard C651 as a requirement in municipal approvals for the disinfection of watermains.
- The first version of the Watermain Disinfection Procedure focused more on repairs of watermains in order to bring a consistent approach to watermain repairs in Ontario.
- After implementation of the procedure, Operating Authorities contacted the Ministry to indicate the need to better define the requirements for disinfection, commissioning, and documentation for new watermains in Ontario.
- Revisions to the procedure were developed by the Ministry in consultation with municipal drinking water system owners, operating authorities and the Ontario Water Works Association (OWWA).
- The updated procedure also includes changes to the watermain repair sections based on comments received about the first version.

What has been updated?

- The Preface and Section 1 of the procedure were almost entirely rewritten to reflect the additional requirements for new watermains.
- Minor changes were made to Section 2 of the procedure.
- Section 3.1 was added to define the requirements for documentation for new watermains.
- The Appendices were updated to reflect the changes to the procedure.

When will the procedure take effect?

- The revised procedure will take effect through conditions in the Drinking Water Works Permit. There are two scenarios that will apply depending on the timing of a system's Municipal Drinking Water Licence renewal.

Scenario 1: Permits specifying timelines for transition

- If the Municipal Drinking Water Licence for the system was renewed in 2019 or 2020, the updated Permit includes a condition (typically condition 2.3) requiring any new procedure to be used within six-months from the time the procedure is published by the ministry. The publication date of the revised procedure is August 1, 2020, requiring these systems to use the new procedure by February 1, 2021.

Scenario 2: Permits that do not specify timelines for transition

- If the system's Permit does not already include a condition (typically condition 2.3) that requires using the updated version of the ministry's Watermain Disinfection Procedure, this condition will be added when the Municipal Drinking Water Licence for the system is renewed. The November 2015 version of the procedure is to be used until the Permit is updated with the new condition at licence renewal, unless the system receives approval from the ministry to use the updated procedure earlier. The updated condition will require the drinking water system to use the updated version of the procedure six-months from the date the renewed licence is issued.

Can the new procedure be used prior to the date indicated in the Drinking Water Works Permit?

- The ministry is encouraging early implementation of the updated procedure as it eliminates the need to apply for relief in certain situations when disinfecting water mains. To implement the August 1, 2020 procedure prior to the date required by conditions in the Permit, systems are required to submit the attached one-page request to MDWLP@Ontario.ca.

Can a municipality partially implement the new procedure before the date indicated in the Drinking Water Works Permit?

- No. Municipalities must use either the 2015 Watermain Disinfection Procedure, or the August 1, 2020 Watermain Disinfection Procedure. The ministry is providing a six-month implementation window in the Permit to ensure municipalities have time to update their Operations and Maintenance Manuals, processes and procedures and train staff on the new procedure; however, the 2015 procedure must be used until the date specified in the Permit unless the municipality has received approval to implement the procedure early. Similarly, if the system has received approval to implement the procedure early, the 2015 Watermain Disinfection Procedure must be used until the date indicated in the approval.

Can this procedure be used for Non-Municipal Drinking Water Systems?

- Although the procedure was written for Municipal Drinking Water Systems, it is expected that Non-Municipal Drinking Water Systems will be using similar approaches.

Preface

Why does the procedure apply to Service Pipes of 100 mm diameter and greater?

- The regulated community advised that larger Service Pipes should be constructed and disinfected in the same way as watermains.
- Service Pipes under 100 mm are typically continuous pipes without bell & spigot joints, and are therefore less prone to contamination during installation. Higher flushing velocities are also more easily obtained.
- Service Pipes under 100 mm, including their appurtenances and fittings, are to be installed using sanitary procedures and flushed, though Operating Authorities may require additional steps as they see fit.
- This procedure does not apply to service pipes on private property, which are regulated under the Building Code, however Operating Authorities may choose to require the procedure to be carried out to disinfect service pipes on private property.

Who do we contact to get relief from a section of the Watermain Disinfection Procedure?

- Deviations from this procedure may be requested from the Ministry's Approval and Licensing office on a case-by-case basis by making a written request to MDWLP@ontario.ca

Section 1 - Addition, Modification, Replacement, Extension and Planned Maintenance

Section 1.1 - Where temporary watermains are installed for non-emergency work, and all other standard installation requirements have been met, is it permissible to maintain a continuous trickle flow to maintain temperature and an Acceptable Disinfectant Concentration during the summer and to prevent pipe freezing in the winter.

- It is the responsibility of the Operating Authority to take steps, such as the ones described above, to ensure that temporary watermains provide safe water.

Section 1.1 - What do we refer to if there is a watermain break in a temporary main?

- Temporary watermains are considered watermains for the purpose of the procedure. The requirements of Section 2 apply.

Section 1.1.1 - Why are we not allowed to use a Double Check Valve Assembly (DCVA) backflow preventer for new watermains?

- The workgroup wanted to ensure that backflow preventer failures could be easily detected by the discharge of water from a reduced pressure principle (RP) backflow preventer.

Section 1.1.1 – Why does the procedure require backflow preventer testing for the first installation of the day only when a backflow preventer is relocated within the same day?

- Some Operating Authorities mentioned that it was very difficult and time consuming to have backflow preventers tested every time they are relocated during the same day. As a result, the decision was made to allow a backflow preventer to be tested for the first installation of the day, and be moved to subsequent locations on the same day without re-testing.
- However, a Certified Operator must be responsible for the relocation to prevent damage. It is expected that the Certified Operator will arrange for testing if it is believed that the backflow preventer could have suffered damage during transit or installation.

Section 1.1.1 – Is there a Ministry-approved equivalent to the Ontario Water Works Association (OWWA) Certified Cross Connection Control Specialist Certificate?

- At this time, there is none, however the “Ministry-approved equivalent” wording was included in case another entity creates an alternate approved licence.

Section 1.1.1 – The procedure refers to a list of professionals in Table 1 of Figure E.1. of CSA Standard B64.10. Who are these people?

- Table 1 of Figure E.1. of CSA Standard B64.10 mentions: Only those persons listed in the Authorized functions list (see Table 1) shall carry out the corresponding functions set out in such list. A copy of the applicable portion of Table 1 is shown below.

Figure E.1 (Concluded)

Item	Authorized function	Professional engineer with tester's licence	Certified engineering technologist with tester's licence*	Licensed master plumber with contractor's and tester's licence	Journey-man plumber with tester's licence†	Apprentice plumber with tester's licence‡	Fire system sprinklerfitter with a tester's licence	Lawn irrigation system installer with tester's licence	Steamfitter with tester's licence
1	Carry out cross-connection survey	✓	✓	✓	✓	—	—	—	—
2	Install, relocate, or replace backflow preventer	—	—	✓	✓	✓	—	—	—
3	Repair backflow preventer	✓	✓	✓	✓	✓	—	—	—
4	Test backflow preventer	✓	✓	✓	✓	✓	—	—	—
5	Complete Items 1, 2, 3, and 4 in relation to fire protection systems	✓	✓	✓	✓	✓	✓	—	—
6	Complete Items 3 and 4 in relation to lawn sprinkler systems	✓	✓	✓	✓	✓	—	✓	—
7	Complete Items 1, 2, 3, and 4 in relation to heating and cooling systems	—	—	—	—	—	—	—	✓

* Required to be under the direction of a professional engineer.

† Required to be employed by a licensed plumbing contractor or licensed fire sprinkler contractor.

‡ Required to be employed by a licensed plumbing contractor and under the direct supervision of a journeyman plumber or master plumber.

- The Watermain Disinfection Procedure also prescribes that a Certified Operator or a Water Quality Analyst with a backflow prevention tester's licence shall also be authorized to test, install, relocate, repair or replace backflow preventers used in the installation and commissioning of new watermains.

Section 1.1.2 – Could you explain what you mean by “When using the Tablet or Continuous Feed Disinfection Method, if the maximum allowable decrease in chlorine concentration is exceeded at any of the sampling points, the disinfection procedure must be repeated.”?

- Ontario’s procedure allows for higher initial chlorine concentrations than the 25 mg/L specified in AWWA C651, but limits the allowable decrease in chlorine concentration at the end of 24-hour contact period.
- Table 1 lists the “Maximum Allowable Decrease in Chlorine Concentration” for the Tablet or Continuous Feed Disinfection Method. The maximum allowable decrease is 40% of the initial chlorine concentration, up to a maximum of 50 mg/L. Example calculations are included in Section 1.1.2 of the procedure.
- Once the initial chlorine concentration has been measured, the Maximum Allowable Decrease in Chlorine Concentration must be calculated. After the 24-hour contact period, if the measured chlorine concentration at any sampling point indicates that the Maximum Allowable Decrease in Chlorine Concentration has been exceeded, the disinfection process must be repeated.

Section 1.1.2 – Can we use different chlorine concentrations/contact times than the ones prescribed in Table 1?

- Different chlorine concentrations/contact times cannot be used without written approval from the Ministry’s Approval and Licensing Office. Requests for deviation from Table 1 will be reviewed on a case-by-case basis.

Section 1.1.2 – Can we use test strips to determine the chlorine concentrations prescribed in Table 1?

- The ministry does not allow the use of test strips to determine the chlorine concentrations recorded to show compliance with Table 1, however test strips can be used when preparing disinfectant solutions or to determine when a chlorine solution is being discharged from outlets as a presence/absence test. Where test strips are used, their accuracy should be confirmed using an electronic direct readout colourimetric or amperometric chlorine meter.

- The Operating Authority shall ensure that the chlorine concentrations recorded to show compliance with Table 1 are determined by:
 - an electronic direct readout colourimetric or amperometric chlorine meter; or
 - another device, if, based on an inspection of the device and on a review of relevant records and documentation, a licensed engineering practitioner states in writing that it is equivalent to or better than an electronic direct readout colourimetric or amperometric chlorine meter, having regard to accuracy, reliability and ease of use.

Section 1.1.3 – Why does the procedure require testing only for Escherichia coli and Total Coliforms?

- The Watermain Disinfection Procedure stipulates only the minimum requirements which are required to be met.
- The Operating Authority may choose to test for additional parameters (such as HPC or Background bacteria), as it has the responsibility to ensure that the new watermain provides safe water.

Sections 1.1.3 and 1.1.4 – Why does the procedure require chlorine residual measurements for the microbiological samples?

- The procedure requires chlorine residual measurements to assist in troubleshooting microbiological parameter exceedances.

Section 1.1.4 - Why does the procedure refer to connections instead of final connections as in AWWA Standard C651?

- The workgroup decided to use “connections” instead of “final connections” to avoid confusion as new watermains can be connected to the drinking water system at multiple locations.

Section 1.1.4.1 describes that a Certified Operator is required to witness the installation of the Connection to ensure that sanitary construction practices are followed, and proper disinfection is performed. When does the installation begin and end?

- The Certified Operator is expected to be present when the new watermain is exposed, the new connection pieces are disinfected and installed, and the bedding installed around the pipe.

Section 1.1.4.2 - Why was the 40-metre exception created and where can we use it?

- Operating Authorities communicated to the Ministry that installations performed under Section 4.10.2 of ANSI/AWWA Standard C651 could require extended road closures of busy streets/highways. The Ministry worked with a few Operating Authorities to create relief conditions in their Permits which were satisfactorily performed. These conditions were added to the procedure.
- This exception is not meant to be used for every watermain installation but may be used if the criteria in Section 1.1.4.2 are met. Systems using this exception are required to document the reason why the exception was used.

Section 1.1.4.3 – Who makes the decision to open the valves to place the new watermain in service?

- The Ministry expects that the Operative Authority, after ensuring that the new watermain was disinfected and connected in accordance with the procedure, allows the valves to be opened to place the new watermain in service and ensures that a Certified Operator operates the valves.

Section 1.1.4.3 - When does a microbiological sample or a disinfectant residual test result have to be reported after the watermain has been placed in service?

- Any *Microbiological Samples* taken and/or disinfectant residual tests performed after a watermain is placed into service are considered as Drinking Water tests for the purpose of the SDWA, and adverse test results are reportable.

Section 1.4 - Would the planned removal of a short pipe section (less than one pipe length) for analysis purpose fall under Section 1.4 Planned Maintenance of Appurtenances and Fittings?

- Yes, however the removal of a short pipe under Section 1.4 is limited to less than one pipe length (Generally ≤ 6 m).

Section 1.5 - Why does the procedure require a Certified Operator for wet taps?

- This requirement comes from Section 5.1 of the “Certification Guide for Operators and Water Quality Analysts”. Performing a wet tap is a task which requires a person certified as an Operator.
- The guide also states that “A person or contractor, not certified as a drinking water operator, can perform functions normally required to be done by a Certified Operator provided they are being directly supervised by a Certified Operator, who is physically present and monitoring the work being performed. The Certified Operator is responsible for all operational work”.

Section 1.7 - Is there a limit to the amount of time that a section of existing watermain can be left isolated from a Drinking Water System?

- The workgroup realized that this is not a one-size-fits-all situation. A watermain that is isolated for a week will be treated very differently than one that was isolated for a year, and an 80-year old watermain will present different challenges than a brand new watermain. That's why the Procedure requires that a plan be developed that reflects the duration of isolation and the associated risks.
- Section 1.7 applies every time a section of an existing watermain remains isolated long enough for the free chlorine residual to decrease below 0.05 mg/L, or for the combined chlorine residual to decrease below 0.25 mg/L.

Section 2 - Watermain Disinfection Procedures for Emergency Repairs

Section 2.1 - Why is a watermain break now a Category 2 by default in the new procedure?

- It was communicated to the workgroup that the categorizing of watermain breaks as 1 or 2 was a source of arguments in the field. The workgroup decided that it would be better to state a default category as a starting point.

Section 2.1 – Why is it that an Operator-in-Charge is the only person allowed to classify a watermain break a Category 1?

- The workgroup wanted to ensure that the operator making the decision would have enough experience/expertise to make the determination.

Section 2.1 - During main breaks, the Operator-in-Charge is to assess the evidence of Contamination or potential Contamination of the watermain throughout the repair procedure and reclassify if required. Does he/she have to be present at all times?

- An Operator-in-Charge must be on site until the repair pieces are installed to be able to state that there was no evidence of contamination or potential contamination of the watermain.

Section 2.1 - Why do I have to speak in person or on the telephone with a person from the Ministry for Water Advisories or Special Cases?

- The procedure requires speaking in person or on the telephone with a person from the Ministry to ensure that the Ministry has the information to respond to inquiries from the public and/or the media.

Section 2.1.3.2 - Why are some Special Case watermain breaks due to Sewage or Chemical Contamination not reportable under Section 16-4 of O. Reg. 170/03?

- Category 2 watermain breaks, including Special Cases, are not reportable to the Spills Action Centre in accordance with Section 16-4 of Schedule 16 of O. Reg. 170/03 unless an Operating Authority believes that contaminated water was directed to users.
- However, the Operating Authority shall verbally notify the Ministry of Special Cases as soon as reasonably possible by speaking in person or on the telephone with a person. The notification shall be made to the local Ministry office during business hours or to the Spills Action Centre outside of business hours.

Section 2.1.3 – Based on the procedure, it appears that most watermain breaks are not reportable to the Spills Action Centre. Are there other situations where watermain breaks need to be reported to the Ministry?

- Watermain breaks are considered Class II spills under O. Reg. 675/98 and are exempt from Part X of the Environmental Protection Act; however, the Ministry expects the Operating Authorities will report watermain breaks which cause adverse effects as Condition 10.1 of Licenses specify:
 - 10.1 Nothing in this licence or the drinking water works permit shall be read as to permit:
 - 10.1.1 The discharge of a contaminant into the natural environment that causes or is likely to cause an adverse effect; or
 - 10.1.2 The discharge of any material of any kind into or in any waters or on any shore or bank thereof or into or in any place that may impair the quality of the water of any waters.
- Reporting these incidents to the Ministry is therefore required under Section 15 of the Environmental Protection Act if the Operating Authority believes that there could be adverse effects.
- The Ministry understands that the determination of adverse effects is a judgment call in these situations. The following is provided to help determine whether the discharge of drinking water from a watermain break would be reportable or not.
 - A discharge to a storm sewer would not be reportable.
 - A discharge which causes injury or damage to a property or plant or animal would be reportable.
 - A direct discharge to a watercourse which would have or may have adverse impacts to fish, vegetation or alter the actual bed of the watercourse (scouring) would be reportable.

Section 2.2.5 – Do I need to measure turbidity to ensure that the discharged water is visibly free from discoloration when Flushing?

- It is not required to measure turbidity under the procedure. Visual observation is sufficient.

Section 2.2.5 Why does the procedure allow for the Exception: “Where the repair was performed using a repair sleeve and flow was maintained from the break until an Air Gap was established, Flushing is not required”?

- This exception was created due to the minimal potential for contamination in this situation, and to avoid the need to flush extremely long watermains (km long) where no sampling point exists. It is thought that installing a flushing point could reduce the life of the watermain.

Section 2.4.3 – Why does the procedure state that one Microbiological Sample shall be taken and submitted as soon as reasonably possible, taking into consideration laboratory working hours and transportation timeframes?

- This wording was created because, in some remote areas, samples taken immediately after a watermain is repaired would be expired before they could be set up for analysis at the laboratory, taking into account the laboratory working hours and/or transportation timeframes.

Sections 2.4.4 and 2.4.5 - Who can declare Water Advisories?

- The Medical Officer of Health is the only entity who can declare an advisory under this procedure.

Section 3 - Documentation

Section 3.1 – Is the Owner expected to supply the microbiological test reports to the Inspector?

- As many Operating Authorities have switched to databases to record required sample results, it is not expected that the Operating Authorities will be provided individual written test reports for every microbiological test result. However, it is expected that the Operating Authorities will be able to show the location of each sample, the date and time of the sampling as well as the sample results obtained.

Section 3.1 – How does the Operating Authority show that sanitary construction practices were followed, and that proper disinfection was performed when installing the connection piece(s)?

- The Operating Authority is not expected to record in detail how sanitary construction practices were followed and proper disinfection was performed during the installation of the connection piece.
- A simple statement or checkbox should be sufficient.

Section 3.1 – What is expected for documentation for “Reason for using the exception” under s. 1.1.4.2?

- It is expected to provide a written description of the reason and sufficient maps/pictures/diagrams to ensure that a Ministry Inspector understands the reason why the exception was applied.