Hi,

Please see the email below and confirm receipt.

Thanks,
Maxwin

I am pleased to provide you with proposed amendments to the ministry’s Watermain Disinfection Procedure (WDP, 2015), for your comment. Please submit all comments in accordance with the instructions below, by inserting using Microsoft Word into the draft document, and submitting to mdwlp@ontario.ca, by January 24th, 2019.

For Office 2010 & 2016
- Highlight the text over which you would like to insert your comment
- Select the “Review” tab on the overhead menu on Word, and select “New Comment”

The amendments were developed with a large stakeholder group composed of municipal representatives, the OWWA/OMWA, OCWA and ministry staff, and their contributions were essential to revising the WDP. The 2015 WDP focussed on addressing procedures for watermain breaks/emergency repairs, while retaining most of ANSI/AWWA C651 (Standard For Disinfecting Watermains) for new watermain
construction. The need for amendments to the 2015 WDP were identified through a number of requests for clarification and relief related to new/planned watermain construction and replacement, which is the primary focus of the proposed changes summarized below:

- WDP applies to temporary water mains and service pipes greater than 100 mm dia. (both breaks and new mains) (refer to Preface)
- Flushing requirements for temporary sources of water supply, and lead sampling requirements for non-NSF/ANSI 61/372 hydrants used as temporary source of water supply to a new watermain. (Refer to Section 1.1)
- Requirements for certified operator and use of certified chemicals (Refer to Preface)
- Backflow prevention shall be accomplished by an air gap or CSA-approved reduced pressure (RP) backflow preventer (DCVA are not acceptable). Testing requirements for RPs. (refer to Section 1.1.1)
- Alternative flushing allowance when scouring velocity not practical (refer to Section 1.1.2)
- Clarification on slug disinfection test requirements (refer to Section 1.1.2, example 3)
- Requirement for chlorine residual testing for new water mains during microbial sampling (refer to Section 1.1.3)
- Backflow prevention mandatory, except for connections (refer to section 1.1.4)
- Exceptions from certified operator requirements for installation/disinfection of connections less than one pipe length (refer to Section 1.1.4.1)
- Expedited disinfection procedures for connections greater than one pipe length if connection crosses transportation corridor or may destabilize thrust block (refer to Section 1.1.4.2)
- Requirements for planned inspection/cleaning when watermain remains in service (refer to Section 1.3)
- Requirement for certified operator/supervision during live tapping (refer to Section 1.5)
- New section for re-commissioning water mains isolated from distribution systems (refer to Section 1.7)
- For water main emergency repairs, all breaks classified as Category 2 (evident or suspected contamination) unless OIC classifies as Category 1 (no evident or suspected contamination) (refer to Section 2.1)
- Documentation requirements – separate requirements for new water mains and water main breaks (refer to Section 3.1 and 3.2)
- New Appendix A – pictures relevant to new water main.
- Definitions have been moved to Appendix G and defined words are in italics throughout the document. New definitions for acceptable disinfectant concentration, connection, directly supervised, and water quality analyst. Updated definitions for backflow prevention and flushing.

The goal of the amendments is to provide clarity regarding disinfection procedures, and workable options to address issues of constructability, traffic obstruction and worker safety. Once the comment period passes, the working group will meet to consider all submissions, prior to finalization of the document. Until such time, the version referenced in your drinking water works permit will continue to be in effect for compliance purposes.

We look forward to your comments, and please contact me if you need any further information.

Aziz

Aziz S. Ahmed, P.Eng. | Manager
Licensing and Approvals Section, Environmental Assessment and Permissions Branch | Environmental Assessment and Permissions Division
Ministry of the Environment, Conservation and Parks | 40 St. Clair Ave. West, 2nd Floor, Toronto, ON M4V 1M2
Tel: 416.314.4625 | Cell: 416.712.7427 | Toll Free: 1-888-999-1305 | Fax: 416.314.1037 | aziz.ahmed@ontario.ca

If you have any accommodation needs or require communication supports or alternate formats, please let me know.
Si vous avez des besoins en matière d’adaptation, ou si vous nécessitez des aides à la communication ou des médias substituts, veuillez me le faire savoir.
Watermain Disinfection Procedure
Draft (October 1, 2018)

FOR DISCUSSION PURPOSES ONLY

Ministry of the Environment, Conservation and Parks
Environmental Assessment and Permissions Division
201X
TABLE OF CONTENTS

1. Addition, Modification, Replacement, Extension and Planned Maintenance
   1.1. New Water mains
       1.1.1. Backflow Prevention Requirements for New Water mains
       1.1.2. Disinfection of New Water mains
       1.1.3. Microbiological Samples for New Water mains
       1.1.4. Connecting New Water mains
           1.1.4.1. Connections equal to or less than one pipe length (generally ≤ 6 m)
           1.1.4.2. Connections greater than one pipe length (generally > 6 m)
           1.1.4.3. Placing New Water mains into Service
   1.2. Relining of Water mains
   1.3. Planned Water main Inspection and Cleaning
   1.4. Planned Maintenance of Appurtenances and Fittings
   1.5. Tapping of Water mains
   1.6. Service Pipes
   1.7. Re-commissioning Water mains Isolated from Distribution System

2. Water main Disinfection Procedures for Emergency Repairs
   2.1. Categorization and Public Agency Notification of Water main Breaks
       2.1.1. Category 1
       2.1.2. Category 2
       2.1.3. Public Agency Notification
           2.1.3.1. Category 1
           2.1.3.2. Category 2
   2.2. Water main Break Common Disinfection Procedure
       2.2.1. Maintenance of Flow
       2.2.2. Excavation Dewatering
       2.2.3. Disinfection of Pipe and Repair Parts
       2.2.4. Installation of Repair Parts
       2.2.5. Post Repair Flushing
       2.2.6. Restoration of Acceptable Disinfectant Concentration and Return to Normal Service
   2.3. Additional Information for Category 1 Water main Break Repairs
       2.3.1. Microbiological Samples (Optional)
   2.4. Additional Requirements for Category 2 Water main Break Repairs

Page i
3. Documentation

3.1. Documentation for New Watermains
3.2. Documentation for Watermain Maintenance and Repairs

Appendix A - Tools to Determine Compliance with New Watermain Requirements – Pictures
Appendix B - Tools to Help Determine the Category of Watermain Break - Flowchart
Appendix C - Tools to Help Determine the Category of Watermain Break - Pictures
Appendix D – Category 1 Flowchart
Appendix E – Category 2 Flowchart
Appendix F – Category 2 – Special Cases Flowchart
Appendix G - Definitions
Preface

This watermain disinfection procedure is a supporting document for Ontario legislation and regulations related to drinking water. The Drinking Water Works Permit (DWWP) Schedule B, Condition 2.3 ("DWWP Condition 2.3") adopts this procedure by reference. Where this procedure makes reference to ANSI/AWWA Standard C651 "Disinfecting Water Mains", the most current version of the standard shall be used. Definitions listed in Appendix G are capitalized and italicized throughout this procedure.

Service Pipes of 100 mm diameter and greater shall be considered as watermains for the purposes of this procedure. The requirements in this procedure also apply to temporary watermains.

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.

Chemicals used for disinfection shall meet the requirements of Schedule B, Condition 14.1 of the current Municipal Drinking Water Licence.

Operating authorities may use best management practices that exceed the minimum requirements in this procedure.
1. Addition, Modification, Replacement, Extension and Planned Maintenance

1.1. New Water mains

For water mains, including temporary water mains, which 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.

Any temporary source of water supply to a new watermain shall be flushed prior to use as water source. When an operating authority is considering using a hydrant which is not NSF 61/372 certified to supply water to a new watermain, the operating authority shall ensure, prior to using the hydrant, that a lead sample is obtained from the hydrant after it has been flushed and that the lead sample results are below the standard from Schedule 2 of Ontario Regulation 169/03. The reporting and corrective actions of Schedule 16 and the applicable Schedule 17 or 18 of O. Reg. 170/03 shall apply. If the results of the resample exceed the standard, another source of the drinking water will have to be used.

1.1.1. Backflow Prevention Requirements for New Water mains

The Backflow Prevention provisions within Section 4.8.9 of ANSI/AWWA Standard C651-14 shall be mandatory for the installation of new water mains.

Where required, Backflow Prevention for new water mains shall be accomplished by:

- an air gap as defined in CSA Standard B64.10 “Selection and Installation of Backflow Preventers”; or
- a CSA-approved reduced pressure (RP) backflow preventer which has been selected, installed, and tested in accordance with CSA Standard B64.10. Backflow preventers shall be field tested according to CSA Standard B64.10. 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.

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, or replace backflow preventers used in the installation and commissioning of new water mains.
1.1.2. Disinfection of New Water mains

For preliminary flushing prior to disinfection, if the requirements of ANSI/AWWA Standard C651 for a scouring 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 watermain is disinfected using the tablet, continuous feed, slug, or spray chlorination method for disinfecting newly constructed watermains 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.

Exception: Where copper pipe is used for smaller diameter watermains, 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.

| 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.

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

Example 1
When using the continuous feed method of chlorination 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 method of chlorination 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 method of chlorination, with a minimum contact time of 3 hours, 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 at any point the chlorine concentration has decreased by more than 25 mg/L, 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. For example, if the initial chlorine concentration in the slug is 150 mg/L, then the chlorine concentration must not decrease below 125 mg/L. If the chlorine concentration were to fall below 125 mg/L (a decrease of > 25 mg/L), the flow shall be stopped and chlorine added to restore the chlorine concentration to 150 mg/L.

1.1.3. Microbiological Samples for New Water mains

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 water mains (including connections) 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 SDWA, and are therefore not reportable. Any person authorized by the owner or operating authority can collect these Microbiological Samples 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 ANSI/AWWA C651, based on the pipe size and the measured flow rate.

1.1.4 Connecting New Watermains

The provisions outlined in Section 4.10 of ANSI/AWWA Standard C651-14 are mandatory, along with the additional requirements prescribed below. The *Backflow Prevention* provisions within Section 4.8.9 of ANSI/AWWA Standard C651-14 are not mandatory for *Connections*.

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

*Connections* equal to or less than one pipe length (generally ≤ 6 m) shall be undertaken in accordance with Section 4.10.1 of ANSI/AWWA Standard C651-14, however 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.

**Exception:** If a *Certified Operator* is not present during the installation and disinfection of the *Connection*, the *Connection* shall remain *Isolated* from the existing drinking water system, except while being flushed or sampled by a *Certified Operator*, until satisfactory results are received from one *Microbiological Sample* taken in accordance with Section 1.1.3 of this procedure from water that has been directed through the *Connection*.

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 C651-14.

**Exception:** If the *Connection*:

- 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, etc.), or
- Cannot be constructed to within one pipe length of the existing watermain due to the potential for destabilizing an existing thrust block,
The following procedure 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. Figure A-S in Appendix A shows a diagram of an example” to help understand this exception.

- The new watermain and Appurtenances forming the Connection shall be spray disinfected or swabbed with a minimum 1% sodium hypochlorite solution 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 by a Certified Operator, until satisfactory results are received from two Microbiological Samples taken in accordance with Section 1.1.3 of this procedure and Section 5.1.1.1 of ANSI/AWWA Standard C651-14.
- 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. Potable water shall be used for hydrostatic testing.

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. Prior to Connection, a Certified Operator shall verify an Acceptable Disinfectant Concentration in the new watermain. When a watermain is placed into service, Flushing through the Connection shall continue until an Acceptable Disinfectant Concentration is achieved. Microbiological Samples taken and disinfectant residual tests performed after a watermain is placed into service are 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 satisfactory Microbiological Sample results if all of the following conditions are met:

- The local Medical Officer of Health is consulted prior to the commencement of the project and their advice is documented and followed; and
- The watermain is physically Isolated from the remainder of the drinking water system through Backflow Prevention; 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 water mains 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. Potable 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 not certified as a drinking water operator can perform wet taps provided they are being Directly Supervised by a Certified Operator.

1.6. Service Pipes
Service Pipes of 100 mm diameter and greater shall be considered as water mains for the purposes of this procedure, and shall be disinfected and tested in accordance with the requirements of ANSI/AWWA 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 prior to placing into service.

1.7 Re-commissioning Water mains Isolated from the Distribution System

Where a section of watermain has been Isolated from a drinking water system and an Acceptable Disinfectant Concentration within the Isolated section was not maintained (e.g., a valved-off stub), the operating authority shall develop and implement a re-commissioning plan that reflects the time period of isolation and the associated risks. The plan may include the implementation of Sections 1.1.2 and 1.1.3 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.

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 or Appurtenance (a “break”).

2.1. Categorization and Public Agency Notification of Watermain Breaks

All breaks shall be classified as Category 2 as per Section 2.1.2 of this procedure unless the Operator-in-Charge (OIC) conducts a visual inspection upon completion of the excavation to determine the nature of the break and classifies it as a Category 1 as per Section 2.1.1. The OIC shall assess the evidence of Contamination or potential Contamination of the watermain throughout the repair procedure and shall reclassify if required.

Refer to Appendices B and C for a flowchart and pictures to better understand the criteria to determine the categories of 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 break shall be reclassified as Category 2.

2.1.2. Category 2

Watermain breaks with evident or suspected Contamination are 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, 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 his/her 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 to the Spills Action Centre 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 his/her 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 unless:
• A Water Advisory is declared. The local Ministry office shall be notified as soon as reasonably possible during business hours. After business hours, the operating authority shall send an e-mail to the e-mail address specified by local Ministry office no later than 10 AM the next business day; or

• In the Special Cases described in Sections 2.4.4 and 2.4.5 of this procedure. The local Ministry office shall be notified as soon as reasonably possible during business hours. After business hours, the operating authority shall contact the Spills Action Centre as soon as reasonably possible.

2.2. Watermain Break Common Disinfection Procedure

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 for special cases are provided in Appendices D, E and F of this procedure respectively. The excavation and dewatering requirements from this section may not apply to repairs of portions of temporary water mains which are above ground.

2.2.1. Maintenance of Flow

The operating authority shall determine if flow can be maintained to the 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 break, where possible, until an Air Gap is established. Flow may be reduced by throttling valves while maintaining sufficient flow from the break to minimize the potential for Contamination. Flow may be discontinued after an Air Gap has been created.

If flow from the break is not maintained before an Air Gap is established, the break shall be classified as 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 break in the watermain 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 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 as well, 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

Flushing shall be conducted following repairs by creating a temporary dead end downstream of the 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 break and discharge from that point.

Flushing shall continue until the discharged water is free from discoloration, and an Acceptable Disinfectant Concentration has been restored. Where the repair was performed using a repair sleeve, and flow was maintained from the break, Flushing is not required.

Dechlorination of discharged water is required for any water that is directed into surface water or if the discharge into the natural environment causes or is likely to cause an adverse effect, as per Condition 10 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 4.5 of Schedule C of the Municipal Drinking Water Licence.

2.2.6. Restoration of Acceptable Disinfectant Concentration and Return to Normal Service

After an Acceptable Disinfectant Concentration has been achieved at the point of flushing, the system can be returned to normal service, defined as having all valves returned to normal operating position.

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 water mains as per ANSI/AWWA Standard C651.

2.4.3. Microbiological Samples (Mandatory)

After the completion of Flushing and restoration of an Acceptable Disinfectant Concentration, 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 water mains as per Section 1.1.1 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 Water mains

When installing new water mains 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 or Reduced Pressure Backflow Preventer installed by section 4.8.9 of AWWA C651-14.
  - Backflow preventer tested as per Section 1.1.1. of this procedure.

- Swabbing and/or flushing have been completed.

- Disinfection Process:
  - Method of disinfection;
  - Disinfection chemical meets AWWA/ANSI safety criteria standard NSF-60;
  - Disinfection: Date and time started and ended;
  - Chlorine residual at start and end of contact time at each sampling point;
  - Decrease in chlorine concentration in mg/L and/or percentage as required; and
  - For slug chlorination: all chlorine residual test results at each sampling point.

- Microbiological Sampling referred to in Section 1.1.3:
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.
- 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 on 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 by using documented benchmarks for the area.

• Microbiological Samples taken (If applicable).
  o Date and location(s) of sample(s) (if applicable, 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

Tools to determine compliance with New Watermain requirements - Pictures

Figure A-1: Temporary connection from hydrant with Backflow Prevention with a CSA approved reduced pressure backflow preventer.

Figure A-2: Temporary connection from watermain with Backflow Prevention with a CSA approved reduced pressure backflow preventer.
Figure A-3: Schematic of temporary connection from hydrant with Backflow Prevention with a CSA approved reduced pressure backflow preventer.
Figure A-4: Schematic of temporary connection from watermain with Backflow Prevention with a CSA approved reduced pressure backflow preventer.
1.1.4.2 Connections Greater than 1 pipe length

Transportation Corridor

New Watermain

Existing Watermain

Temporary connection with backflow preventer for watermains

Up to 40 meter exemption allowed before temporary connection with backflow preventer

Figure A-5: Example of Exception in Section 1.1.4.2.
APPENDIX B

Tools to Help Determine the Category of Watermain Break - Flowchart

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

Watermain break is detected

Maintain flow (if possible) until Air Gap is created [s.2.2.1]

OIC visually inspects excavated main to determine nature of break?* [s.2.1]

Yes

Will repair involve replacement of more than one pipe length? [s.2.1.2]

Yes

Is Contamination evident or suspected?

No

Category 1** [s.2.1.1]

Continue to Appendix D

If Contamination is evident or suspected at any time during the repair or the Air Gap is not maintained throughout repair [s.2.2.2]

Category 2 [s.2.1.2]

Continue to Appendix E

**An OIC must remain on-site throughout a Category 1 repair to assess the evidence of Contamination or potential Contamination. If an OIC cannot be present for the duration of the repair, the break shall be reclassified as a Category 2.
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 C-1: Circumferential watermain break with flow maintained until after an Air Gap was created.

Figure C-2: Corrosion hole leak in a watermain with flow maintained until after an Air Gap was created.
Examples of watermain breaks that are typical of Category 2 are included below for illustrative purposes only:

Figure C-3: Longitudinal watermain break with evident Contamination.

Figure C-4: Spiral watermain break with evident Contamination.
APPENDIX D – 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.

Category 1
(continued from Appendix B)

Notification to Ministry and local MOH is not required (unless MOH provides direction to do so)  
[s. 2.1.3.1]

Continue dewatering excavation for duration of repairs to maintain Air Gap*  
[s.2.2.2]

Disinfect pipe and repair parts with minimum 1% sodium hypochlorite solution immediately prior to installation  
[s.2.2.3]

Install repair parts while ensuring that Contaminants do not enter the watermain  
[s.2.2.4]

Conduct post-repair Flushing through location of repair.** Dechlorinate as required.  
[s.2.2.5]

Continue to Flush until an Acceptable Disinfectant Concentration is achieved  
[s.2.2.6]

Return system to normal service

Document repair  
[s.3.2]

*If the Air Gap is not maintained throughout the repair or Contamination is evident or suspected at any time during the repair, the break shall be reclassified as Category 2 (refer to Appendix E)

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

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.

Category 2 (continued from Appendix B)

- **Was contaminated water directed to users?**
  - Yes: Take corrective action as per Schedule 17 or 18 of O. Reg. 170/03 (as applicable) [s.2.1.3.2]
  - No: Is there evident or suspected sewage or chemical contamination?
    - Yes: Continue to Appendix F for "Special Cases" [s.2.4.4 & s.2.4.5]
    - No: Notification to local Ministry office is not required for Category 2 mainbreaks (unless a Water Advisory is declared)* [s.2.1.3.2]

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

- Continue dewatering excavation for duration of repairs to maintain Air Gap [s.2.2.2]
- Take additional steps to remove Contaminants from watermain (as appropriate) [s.2.4.1]
- Disinfect pipe and repair parts with minimum 1% sodium hypochlorite solution immediately prior to installation [s.2.2.3]

Next page
Category 2
(continued from previous page)

Use additional disinfection procedures as appropriate
[s.2.4.2]

Install repair parts while ensuring that Contaminants do not enter the watermain
[s.3.2.4]

Conduct post-repair Flushing through location of repair. *
Dechlorinate as required.
[s.2.2.5]

Continue to Flush until an Acceptable Disinfectant Concentration is achieved
[s.2.2.6]

Take at least one Microbiological Sample
[s.2.4.3]

System may be returned to normal service prior to receipt of sample results
[s.2.4.3]

Document repair
[s.3.2]

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

The following flowchart depicts the requirements for special case *Contamination* (sewage or chemical) as a result of a watermain break.
Special Case: Sewage or Chemical Contamination
(continued from Appendix E)

Notify Ministry as soon as reasonably possible:
During business hours → Local office
After business hours → Spills Action Centre
[s.2.1.3.2]

Develop and implement site-specific sampling/disinfection/decontamination plan
[s.2.4.4 or s.2.4.5]

Plan must include as a minimum taking two sets of Microbiological Samples at least 24 hours apart
[s.2.4.4]

Plan must be finalized in agreement with the local Ministry office (in consultation with local MOH)
[s.2.4.5]

Affected watermain(s) may be placed into service if a Water Advisory is declared
[s.2.4.4 or s.2.4.5]

Complete corrective actions and sampling plan to the satisfaction of local Ministry office
[s.2.4.4 or s.2.4.5]

Return system to normal service

Document repair
[s.3.2]
APPENDIX G

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 an air 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 and soil 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.

"Backflow Prevention" means the prevention of a reversal of normal flow that could introduce
Contamination to the potable water supply.

"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.

"Flushing" means valve operation to restore an Acceptable Disinfectant Concentration and discharge
suspended materials until the water appears clear by flowing water through a section of watermain and
out of the system. This definition does not include recharging the watermain or a requirement to
achieve scouring velocity within the 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 the isolated watermain section.

"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. 170/03.