Chatham-Kent Public Utilities Commission

DWQMS Procedure

Title: Main Repair Procedure: Category 2 (b): Evident or Suspected Contamination, Sampling Required	**Control No:** 2001666	**Revision No:** 4 **Effective Date:** 2021-Apr-13
Authors (Original): Lilly Snobelen Ryan Leeson **Author (Current Revisions):** Ryan Leeson	**Reviewer(s):** PUC Directors & Managers PW Director, Managers & Supervisors	**Approver:** Tim Sunderland

1.0 Purpose

The purpose of this Procedure is to provide an instruction for the repair and sampling of Category 2 (b) Main Breaks.

2.0 Scope

This Procedure is applicable to all PUC and DS personnel, including the DS OIC.

This Procedure applies to municipal service pipes of 50 mm diameter and greater which shall be considered watermains for the purposes of this procedure.

From the Watermain Disinfection Procedure – MECP – Environmental Assessment and Permissions Division – August 1, 2020:

> Service pipes of 100 mm diameter or greater shall be considered watermains for the purpose of 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.* ***ADDED***

The Contractor, including the Public Works Contractor, shall advise the Manager of Compliance & Quality Standards, or designate, if a water service interruption affects the following (refer to Section 6.0 for details):

- Schools
- Retirement Homes
- Hospitals
- Food Premises

3.0 References

Drinking Water Works Permit (DWWP) - Schedule B, Condition 2.3
Watermain Disinfection Procedure, MECP, EAPD, 2020-Aug-01
AWWA Standard - Disinfecting Water Mains - C651 (current version)
Municipal Drinking Water Licence (MDWL)
O. Reg. 170/03

4.0 Definitions

Air Gap means an air space at the location of the maintenance/repair between exterior surface of the watermain and the interior surfaces of the excavation, including the water in the excavation, sufficient to prevent water, soil or other contaminants in the excavation from contacting the watermain, fittings, or appurtenances throughout the maintenance/repair process.

DS Distribution System

OIC Operator in Charge

ORO Overall Responsible Operator

5.0 Procedure

5.1 Categorization

a. *All watermain breaks shall be classified as Category 2 (a), 2 (b) or 2 (c) unless an 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.* ***NEW***

b. A DS OIC shall classify watermain breaks with evident or suspected contamination as Category 2 (b) or 2 (c).

Wholly or partially dewatered mains showing no evident or suspected contamination, and followed by confirmatory bacti sampling, shall be classified as Category 2 (a). If, at any time, Contamination is evident or suspected, the DS OIC shall reclassify the break as Category 2 (b) or 2 (c).

Evident or suspected sewage contamination or chemical contamination shall be categorized as a Category 2 (c).

c. *Watermain repairs involving more than one pipe length (generally ≥ 6 m or 20 ft) of replaced pipe are classified as a Category 2 (a), 2 (b) or 2 (c).* ***ADDED***

d. The DS OIC shall assess the evidence of contamination of the watermain throughout the repair procedure and reclassify if required.

e. Refer to the Main Break Identification and Classification – Procedure (Control No. 2001662) for further information regarding categorization.

5.2 Basic Disinfection Practices

a. Work should follow basic disinfection and contamination prevention procedure including preventing contaminants from entering the existing pipe during repair such as:

i. by maintaining positive pressure in the leaking pipe until the repair site on the pipe is fully exposed,

ii. by maintaining a dewatered trench,

iii. by keeping all pipe materials used in the repair in a clean and sanitary condition.

b. Many leaks or breaks can be repaired under controlled conditions without depressurising the watermain, such as when applying a clamp to a small crack or a small hole, thus preventing contaminants from entering the water system.

5.3 Watermain Break Common Disinfection Procedures

a. Maintenance of Flow

i. The Distribution Contractor 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 minimise the potential for contamination. Flow may be discontinued after an Air Gap has been created.

ii. If flow from the watermain break is not maintained before an air gap is established, the watermain break shall be classified as a Category 2 (b) or 2 (c). ***NEW***

b. Excavation Dewatering

i. 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 (b) or (c).

c. Disinfection of Pipe and Repair Parts

i. 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 disinfection procedure shall be repeated.

ii. 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.

d. Installation of Repair Parts

i. The repair parts shall be installed while ensuring that contaminants do not enter the watermain.

e. Post-Repair Flushing and Return to Normal Service

i. 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.

ii. Flushing shall continue until the discharged water is visibly free from discolouration and particulates, and until the disinfectant concentration at the point of flushing has been restored and is representative of the system residual in the break area, determined by sampling upstream of the break area and downstream at the flushing location. Flushing shall continue until the disinfectant concentration at the point of flushing reaches at least 0.20 mg/L free chlorine.

Flushing is not required when the repair was performed using a repair sleeve and flow was maintained until an air gap was established. ***NEW***

iii. Following flushing the system can be returned to normal service, defined as having all valves returned to normal operating position. ***ADDED***

iv. 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 of Schedule B of the Municipal Drinking Water Licence (MDWL).

5.4 Additional Information for Category 2 (b) Watermain Break Repairs

a. Category 2 (b) watermain breaks are deemed to be observations of improper disinfection in accordance with Section 16-4 of Schedule 16 of O.Reg. 170/03, and are reportable to the Spills Action Centre.

i. The DS OIC shall notify the PW Distribution Supervisor. If the PW Distribution Supervisor is unavailable, notification shall be made to the PW ORO.

ii. The PW Supervisor or ORO shall notify the PUC Manager of Compliance & Quality Standards.

iii. The Manager of Compliance & Quality Standards, or designate, shall ensure the following notifications are made:

1) Notify MOH Health Unit

2) Notify Ministry SAC

3) Email Ministry Inspector

b. Removal of Contaminants from Watermain

i. Appropriate additional steps shall be undertaken to remove contaminants from the watermain such as:

1) Physical removal of contaminants;

2) Flushing into the excavation;

3) Higher velocity flushing after repairs where practical and feasible

c. Additional Disinfection Procedures

i. In addition to Disinfection of Pipe and Repair Parts (5.3 c.), depending on the nature and severity of the contamination, the DS OIC may use site-specific disinfection procedures. These steps may include the New Watermains Disinfection Procedure (Control No. 2000677).

d. Temporary DS Operating Conditions

i. Temporary dead-end downstream of the break to be maintained, if possible, until two (2) consecutive sets of samples with satisfactory results have been received.

e. Microbiological Samples (Mandatory)

i. After the completion of flushing and additional disinfection procedures (if applicable), microbiological samples shall be taken following Category 2 (b) watermain break repairs.

ii. The flow shall be directed to ensure that the sample(s) represents water that has passed through the location of the repair. ***ADDED***

iii. 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 shall apply. ***ADDED***

iv. The DS OIC shall call in the PUC On-Call Certified Operator (the PUC Sampler) in order to take the sample(s) after the watermain has been flushed.

1) If no other sampling port is available, well flushed fire hydrants may be used for sampling, but do not represent optimum sampling conditions.

2) If it is necessary to sample from a hydrant, flush the hydrant well prior to sampling. A spigot shall be used, including a cap and hose bib so that the flow can be slowed to allow for sampling. After flushing, disinfect the hydrant port, spigot, cap and hose bib prior to sampling. Open spigot and flow water through hose bib until water runs clear. Then slow flow from spigot.

PUC On-Call Contacts

AREA	NUMBER
Bothwell	226-229-0015
Chatham	519-359-9644
Dresden	519-359-9644
Eberts area	519-359-9644
Highgate	226-229-0015
Ridgetown	226-229-0015
South	519-350-3807
Thamesville	519-359-9644
Tilbury	519-350-3511
Wallaceburg	519-359-2651
Wheatley	226-229-2696

v. A PUC Certified Operator will perform microbiological sampling for Category 2 (b) watermain break repairs.

1) Take chlorine free and total chlorine samples, to confirm acceptable chlorine residuals.

2) Take the direction of the Health Unit with respect to sampling. Steps may include:

2.1 Take at least one sample from the same location as the sample that gave rise to the corrective action.

2.2 Take at least one sample from a location that is a significant distance upstream from the first sample.

2.3 Take at least one sample from a location that is a significant distance downstream from the first sample, if it is reasonably possible.

2.4 If the sample location that gave rise to the corrective action is a dead-end, a downstream sample is not possible. In that case, take 2 upstream samples.

3) Another set of samples must be taken at a minimum of 24 hours after the first set of corrective action samples were taken.

4) If a positive bacteriological sample is returned, continue sampling and testing until two consecutive satisfactory results, taken a minimum of 24 hours apart, are returned.

vi. The DS OIC may return the watermain to normal service, defined as having all valves returned to normal operating position, prior to receipt of the microbiological sample results.

5.5 Category 2 (b) Flowchart

The following flowchart is an example of the typical steps required for **Category 2 (b)** 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.

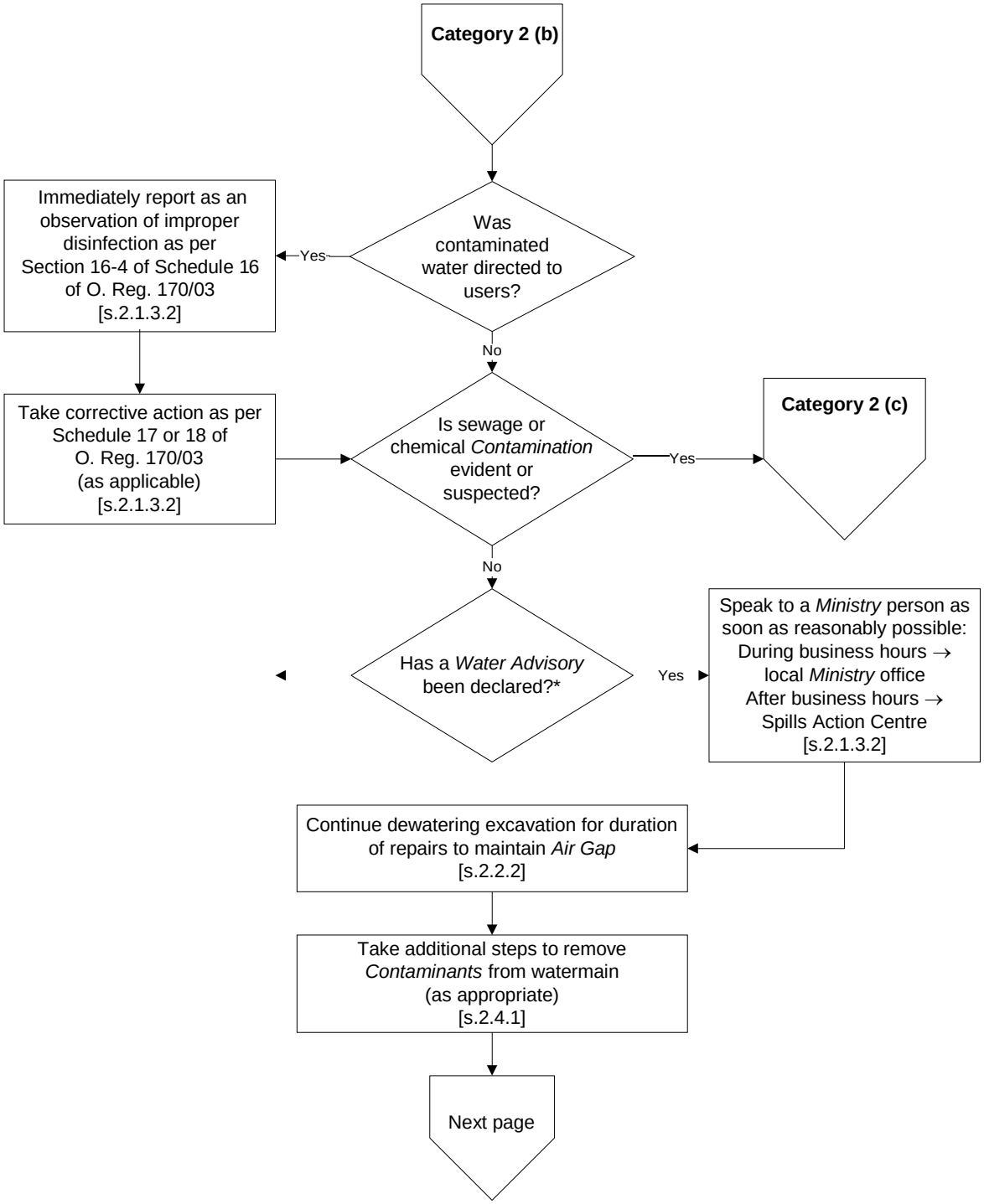
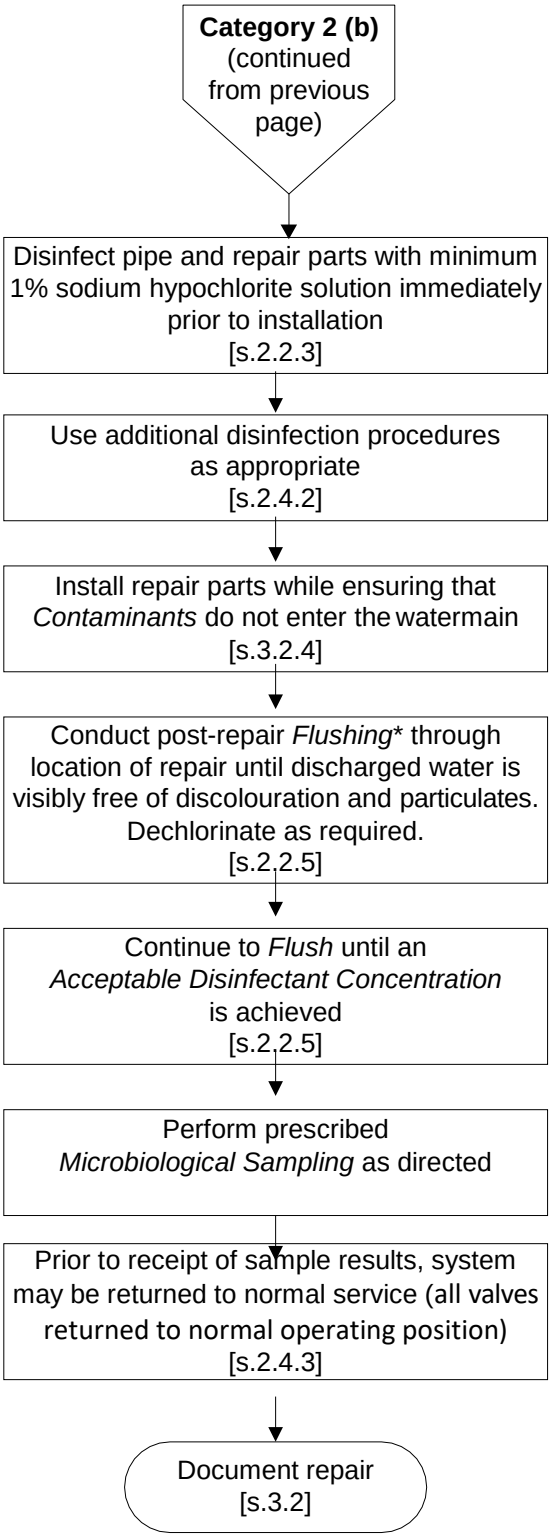


Chart from Appendix F of the Watermain Disinfection Procedure, MECP, EAPD, 2020-Aug-01



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

Chart from Appendix F of the Watermain Disinfection Procedure, MECP, EAPD, 2020-Aug-01

5.6 Documentation

a. The DS OIC shall complete and maintain the following records as a minimum, in the bound DS Main Repair Record Book provided by the PUC.

<table>
<tr><td colspan="2">OIC:</td><td colspan="2">ORO:</td><td>DAY:</td><td>MO:</td><td>YR:</td></tr>
<tr><td colspan="3">Crew Operators - Print Name:</td><td colspan="4">Crew Operators - Print Name:</td></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3"></td><td colspan="4"></td></tr>
<tr><td colspan="3">Date of Initial Response:</td><td></td><td colspan="3">Time of Initial Response:</td></tr>
<tr><td colspan="3">Break Reported by:</td><td colspan="4"></td></tr>
<tr><td colspan="3">Location of Main Repair:</td><td colspan="4"></td></tr>
<tr><td colspan="3">Main Material:</td><td colspan="4"></td></tr>
<tr><td colspan="3">Size of Main:</td><td colspan="4"></td></tr>
<tr><td colspan="3">Cover in feet and inches:</td><td colspan="4"></td></tr>
<tr><td colspan="3">Work Order Number:</td><td colspan="4"></td></tr>
<tr><td colspan="5">Flow maintained until Air Gap created?</td><td>Yes</td><td>No</td></tr>
<tr><td colspan="7">If Watermain Break: Indicate type of Watermain Break by Circling the Correct Choice: Circumferential, Longitudinal, Circumferential, Longitudinal, Blowout, Joint, Split at Corporation, Sleeve, Split Bell, Spiral, Rupture, Hole, Leak at Main Stops/Tapping Valves</td></tr>
<tr><td colspan="7">If Planned Maintenance, indicate type of Planned Maintenance: eg Valve Replacement, etc</td></tr>
<tr><td colspan="5">Air Gap maintained, once established, throughout the repair process</td><td>Yes</td><td>No</td></tr>
<tr><td colspan="5">Evident or Suspected Contamination of the Watermain Before or During the Repair Process:</td><td>Yes</td><td>No</td></tr>
<tr><td colspan="7">Classification of Main Break: Circle correct Category (see references below):</td></tr>
<tr><td>Category 1</td><td colspan="2">Category 2(a)</td><td>Category 2(b)</td><td colspan="2">Category 2(c)</td><td>-</td></tr>
<tr><td>Postive Pressure

Maintained
(No evident or suspected contamination)</td><td colspan="2">Wholly or Partially

Dewatered
(No evident or suspected contamination)</td><td>Wholly or Partially
Dewatered
(Evident or suspected contamination)</td><td colspan="2">Special Case

(Sewage or Chemical contamination)</td><td>-</td></tr>
<tr><td colspan="7">Apparent Cause of Break: Circle choice:
Water hammer (surge), Defective Pipe, Corrosion, Deterioration, Improper Bedding, Excessive Operating Pressure, Differential Settlement, Temperature change, Contractor, Misc</td></tr>
<tr><td colspan="7">Type of Repair: eg clamp, cutout, etc</td></tr>
</table>

Pipe and Repair Parts Disinfected:	Yes	No
Post Repair Flushing: Required for Category 2(a), 2(b), 2(c)		
Creation of temporary dead end downstream of the break through valve operation	Yes	No
if answered No above, why?: _____		
Flushing through location of the repair to a discharge point	Yes	No
Disinfectant Residual on Final Post Repair Flushing: MUST BE GREATER THAN 0.20 mg/L Free		
Downstream at the Flushing Location:		
Address/Location: _____ _____ mg/L Time: _____		
Upstream of the break Location: (to detemine representative system disinfectant concentration)		
Address/Location: _____ _____ mg/L Time: _____		
Removal of contaminents from watermain: for Category 2(a), 2(b), 2(c)		
Physical Removal of Contaminents	Yes	No
Flusing into the excavation	Yes	No
Higher velocity flushing (where practical and feasible)	Yes	No
Microbiological Samples Taken: Required for 2(a), 2(b) and possibly 2(c)	Yes	No
Return to Normal Service: (all valves returned to normal operating position)		
Date (DD/MM/YYYY): _____ Time: _____		
OIC Comments:		
Supervisor Review:		
Name: _____ Sign/Initial: _____		
Date (DD/MM/YYYY): _____		
Supervisor Comments:		

b. The Manager of Compliance & Quality Standards, or designate, shall ensure record is made and maintained of the following if an Advisory was issued:

i. Notification to MOH Health Unit: Date and Time

ii. Notification to Ministry SAC: Date and Time

iii. Notification to Ministry Inspector or Designate: Date and Time

6.0 Associated Forms/Procedures/Work Instructions

- New Watermains Disinfection Procedure (Control No. 2000677)
- New Firelines 100 mm diameter or greater and New Water Services 100 mm diameter or greater Disinfection Procedure (Control No. 2001678)
- ORO List – Distribution Systems (Control No. 2001009)
- Main Break Identification and Classification – Procedure (Control No. 2001662)
- Main Repair - Procedure Category 1 (Control No. 2001664)
- Main Repair - Procedure Category 2 (a) (Control No. 2001665)
- Main Repair - Procedure Category 2 (c) (Control No. 2001667)
- Water Info Message Template – Watermain Repair (Control No. 2001192)
- Water Info Message Template – Water Service Interruption (Control No. 2001955)
- Adverse Water Quality – Contingency (Control No. 2001863)
- Boil Water – Contingency (Control No. 2001864)
- Bacti Sampling Collection and Handling – Procedure (Control No. 2001611)

- Email from Rosemarie Arndt, former Program Manager, Environmental, Chatham-Kent Public Health Unit

From: Rosemarie Arndt
Sent: October-18-17 4:26 PM
To: Darren Galbraith <darrenga@chatham-kent.ca>
Subject: When should Public Health be called

Chatham Kent Public Health should be advised of all interruptions to water services (repair, upgrade, etc.) for the following locations:

1. Schools,
2. Retirement homes,
3. Hospitals,
4. Food Premises

The contractor along with the affected facility shall outline in writing the plan to restore water services. This plan may be written in point form. In the plan shall be a description of all actions intended to be taken including as a minimum the following:

1. Reason for the water service interruption
2. Who is contracted to complete the services
3. How long the interruption will last
4. Communication plans for all involved
5. Control measures before and after to ensure the safety of the water particularly with regards to
    a. notifications,
    b. signage,
    c. disinfection,
    d. flushing, and
    e. Cl residual testing
    f.

Following receipt of this information the Public Health Inspector will review and determine if any further action is required.

You can reach a Public Health Inspector in the Chatham Kent Public Health by calling 519.352.7270 and asking to speak to a Public Health Inspector.

Rosemarie Arndt CPHI(C), BHSc (PH), Ad Ed.
Program Manager, Environmental
CK Public Health | *Municipality of Chatham-Kent*
Phone: 519.352.7270 ext. 2480 | 435 Grand Ave. W., Chatham, ON N7M 5L8 |
rosemariea@chatham-kent.ca

7.0 Records

- DS Main Repair Record Book
- PW Field Change Request
- PW Work Order
- PUC Logbook
- Chains of Custody
- Microbiological Sample Results
- Adverse Water Quality Incident Reports
- Contractor Plan to Restore Water Services (CK Health Unit requirement)