

Title: Response to Adverse Water Quality Test Result		
Group: Waterworks	Control Number: 16b	
Revision: 2.0	Effective Date: March 2, 2009	
Author: H. Dutaud	Reviewer: R. Flindall and K. Dennison	Approver: E. Wu

1.0 Activity Description

This is the procedure for the Town of Markham Waterworks staff to follow when water quality test results indicate adverse water quality and a report is required under subsection 18(1) of the Safe Drinking Water Act and in compliance with the Ministry of the Environment (MOE) Drinking Water Systems Regulation (O. Reg. 170/03).

2.0 Reference System-Level Document(s)

- SLD16a – Sampling
- SLD 16b – Testing
- SLD18 – Emergency Management

3.0 References

- Notice of Adverse Test Results and Other Problems and Notice of Issue Resolution at Drinking Water Systems (MOE form #4444e)
- O. Reg. 170/03

4.0 Definitions

Indicator of Adverse Water Quality - Operational / on-site observations that may result in an adverse water quality situation, with no lab notification.

Resample (Microbiology) - Resampling must consist of three (3) samples:

- a) One (1) collected at the affected site;
- b) One (1) at the nearest location (downstream); and
- c) One (1) at the nearest location (upstream). (Refer to Town of Markham Sampling Locations & Map”). Unless the affected site is a Dead End and no downstream location is available.

Resample (Chemical and/or Sodium) – Resampling must consist of one (1) sample collected at the affected site.

5.0 Tools and Equipment

- Appropriate sample bottles or containers
- Chlorine Residual Tester

6.0 Procedure

In the event of a test result indicating adverse water quality the following steps must be taken by Markham Waterworks:

An adverse water quality test result or observation must be considered a Level 2 Emergency and staff will in addition follow the procedures described in SOP 18b – Level 2 Emergency Response. In the event of a change or escalation in the status of the emergency, staff will follow the escalation and notification procedures described in SLD 18 – Emergency Management and process flow chart PF 18 – Emergency Management Process Flow.

6.1 NOTIFICATION

6.1.1 Tests Conducted by Licensed Laboratory

When a drinking water test conducted by a laboratory indicates adverse drinking water quality, the laboratory must notify the Town by speaking to a live person. The laboratory will immediately verbally notify the Water Quality Coordinator or the On-call Waterworks Supervisor or their designate. The laboratory must also provide written notification to the Town by completing Section 1 and Section 3 of MOE Form #4444e. This completed form will be faxed to the Town and received by the Water Quality Coordinator. Waterworks must ensure the following information is provided:

- a) the location of the failed water sample,
- b) the parameter that has failed,
- c) the Adverse Water Quality Incident # (AWQI #).

6.1.2 Tests Conducted by Certified Operator for Chlorine Residual

1. When a test conducted by a Certified Operator indicates that the combined chlorine residual is less than 0.25 mg/L the Waterworks Operator shall immediately speak to a Waterworks Supervisor and/or the Water Quality Coordinator or their designate and provide the following information:

- a) the location of the low chlorine level sample, and

- b) the value of the Combined Chlorine Residual tested.
2. The Water Quality Coordinator will be responsible to undertake the verbal and written notifications required in 6.1.4 and 6.1.5

6.1.3 Indicator of Adverse Water Quality

1. When a Certified Operator witnesses an on-site observation that could potentially lead to an adverse quality incident, the Waterworks Operator shall speak immediately to a Waterworks Supervisor and/or the Water Quality Coordinator or their designate and inform them of the situation with the following information:
 - a) the location of the on-site observation,
 - b) the indicator of the adverse water quality
2. The Water Quality Coordinator will be responsible to undertake the verbal and written notifications required in 6.1.4 and 6.1.5

6.1.4 Verbal Notification

1. Upon notification of an adverse test result from either 6.1.1, 6.1.2 or 6.1.3, the Water Quality Coordinator or their designate must immediately verbally notify a “**LIVE PERSON**” in:
 - a) The Region of York Public Health Department. (**Office Hours (M-F 8:30 – 4:30) Tel. # 1-877-464-9675 x 4599; After Hours Pager # 905-830-3375**).
 - b) The Ministry of the Environment (MOE) Spills Action Centre (SAC).
 - (**Office/After Hours Tel. # 1-800-268-6060 or 416-325-3000**). Waterworks to confirm the AWQI # for adverse results detected through laboratory analysis.
 - For adverse results reported by the Town as a result of a test completed by a Certified Operator (6.1.2) or an observation made by a Certified Operator (6.1.3) ensure a AWQI # is assigned.
 - c) Region of York Control Panel (**Tel. #905-881-8742**) should the adverse result be the presence of E. Coli.
2. Waterworks to ensure that all contact information is correctly documented (agency, person spoken to, date, time).

3. If the test result from 6.1.2 or observation from 6.1.3 indicating adverse water quality occurs after-hours, the on-call Operator shall undertake the required verbal notification. The on-call Operator will advise the on-call Supervisor of all actions taken and record the information on the 'Adverse Water Quality Notification Form'.

6.1.5 Written Notification

1. The Water Quality Coordinator or their designate must complete section 2(a) of the MOE Form #4444e, within 24 hours, and
2. Fax the completed to:
 - a) MOE/SAC (fax # 1-800-268-6061 or 416-325-3011), and
 - b) The Region of York Public Health Department (Fax # 1-905-895-3166, Attention: Public Health Inspector)
3. Waterworks must print a confirmation that all forms have been faxed successfully to MOE/SAC and Public Health Department and file all documents.
4. If the test result from 6.1.2 or observation from 6.1.3 indicating adverse water quality occurs after-hours, the on-call Supervisor will ensure that Written Notification required in 6.1.5 is completed.

6.2 CORRECTIVE ACTION

- 6.2.1 Waterworks must issue an appropriate Work Order for the corrective action required.

6.2.2 MICROBIOLOGY – Escherichia coli (E.Coli) (O. Reg. 170/03, Section 17-5)

1. Flush watermain at closest location to failed sample to ensure that a chlorine residual of at least 1.0 mg/L is achieved and maintained until all resamples have passed.
2. Resample and test immediately.
3. Collect (2) consecutive sets of resamples one (1) day apart.
3. MICROBIOLOGY SAMPLING must follow the Work Instruction "Procedures for Microbiology Sampling & Combined Chlorine Residual for Existing Water Distribution System".
4. Complete a "Chain of Custody Form" in order to make request to laboratory for membrane filtration (MFEC), and deliver all samples immediately to the laboratory. At delivery, ensure a copy of the "Chain of Custody Form" is brought back after the laboratory has processed the "Chain of Custody Form". After hours the laboratory will fax the "Chain of Custody Form" the next business day.

5. WATERWORKS Supervisor to contact Region of York Control Panel via e-mail at **All_ENV_WWW_HUB7@york.ca** and **All_ENV_Control_Panel_Ops@york.ca** advising them of the adverse incident, location and Pressure District and requesting chlorine residual data from the closest on-line analyzer in that particular Pressure District and request an increase of chlorine to Markham's distribution system.
6. Supervisor must verbally contact the Region of York Control Panel at **Tel. # 905-881-8742** to obtain number of the Region of York On-Call Operator.
7. Supervisor must then verbally contact the Region of York On-Call Operator to advise them of the details of the adverse incident, including the location and which Pressure District it was located in, and request Region of York to provide chlorine residual data from the closest on-line analyzer and that the chlorine be increased into Markham's distribution system.
8. Region of York will provide Waterworks with the combined chlorine residual levels at the closest on-line analyzer in that particular Pressure District, verbally and in writing by providing an e-mail response or a written fax.
9. If the chlorine residual of 1.00 mg/L can not be achieved the Supervisor must confirm the combined chlorine residual level of the closest on-line analyzer from Region of York in that particular Pressure District and flush to that level.
10. If the combined chlorine residual of at least 1.0 mg/L is not obtained Waterworks Supervisor to contact the Public Health Department and MOE (SAC) to advise them that 1.0mg/L has not been obtained, advise them of what has been done to date and seek further direction
11. Region of York to forward any communication with City of Toronto to Markham Waterworks.
12. If the test result for a resample taken indicates adverse water quality, repeat steps in 6.1 Notification to obtain a new AWQI # for the new incident and subsequently repeat steps in 6.2.2 Corrective Action and subsequently repeat steps in 6.2.2 Corrective Action.
13. Water Quality Coordinator or the Waterworks Supervisor will then inform the ORO, the Manager of Operations & Maintenance, The Manager of System Engineering and General Manager of Waterworks or his designate as described in SOP 18b indicating a possible escalation of the Level 2 Emergency.

6.2.3 **MICROBIOLOGY – Total coliform – (O. Reg. 1703/03, Section 17-6)**

1. Flush watermain at closest location to failed sample.

2. Resample and test immediately.
3. Collect (2) consecutive sets of resamples one (1) day apart. MICROBIOLOGY SAMPLING must follow the Work Instruction “Procedures for Microbiology Sampling & Combined Chlorine Residual for Existing Water Distribution System”.
4. Complete a “Chain of Custody Form” in order to make request to laboratory for membrane filtration (MFTC), and deliver all samples immediately to the laboratory. At delivery ensure a copy of the “Chain of Custody Form” is brought back after the laboratory has processed the “Chain of Custody Form”. After hours the laboratory will fax the “Chain of Custody Form” the next business day.

6.2.4 **MICROBIOLOGY – Total coliform - Adverse Resample – (O. Reg. 1703/03, Section 17-6)**

1. If the test result for a **resample** taken indicates adverse water quality, repeat steps in 6.1 Notification to obtain a new AWQI # for the new incident
2. If the test result for a **resample** taken indicates adverse water quality follow the corrective action described in 6.2.2 Corrective Action
3. Water Quality Coordinator or the Waterworks Supervisor will then inform the ORO, the Manager of Operations & Maintenance, The Manager of Systems and General Manager of Waterworks or his designate as described in SOP 18b indicating a possible escalation of the Level 2 Emergency

6.2.5 **CHLORINE RESIDUAL (O. Reg. 170/03, Section 17-4)**

1. Immediately proceed with flushing as per Work Instruction “Watermain Flushing Procedures for Maintenance of Chlorine Residual” until Combined Chlorine Residual level reaches the immediate system level at designated location.
2. If Waterworks Operator is unable to obtain the minimum combined chlorine residual of 0.25 mg/L after the required flushing, they must contact the Waterworks Supervisor regarding the results.
 - a) The Waterworks Supervisor will contact the Region of York Control Panel at **Tel. # 905-881-8742**, and the City of Toronto Control Center at **Tel. # 416-392-8280** to proceed with remedial actions to raise the chlorine level in the distribution system.
 - b) The Waterworks Supervisor will contact Water Quality Coordinator, or their designate, to advise the Public Health Department that the low combined chlorine residual level

has not been resolved through flushing and advise them what has been done to date and seek further direction.

- c) Water Quality Coordinator or the Waterworks Supervisor will then inform the ORO, the Manager of Operations & Maintenance, The Manager of Systems and General Manager of Waterworks or his designate as described in SOP 18b indicating a possible escalation of the Level 2 Emergency.

6.2.6 **CHEMICAL (O. Reg. 170/03, Section 17-10)**

1. Resample and test as soon as reasonably possible. Chemical sampling must follow the Work Instructions “Procedures for Chemical Sampling”
2. Resampling must consist of one (1) sample collected at the affected site.
3. Complete a “Chain of Custody Form”, and deliver all samples immediately to the laboratory. At delivery ensure a copy of the “Chain of Custody Form” is brought back after the laboratory has processed the “Chain of Custody Form”. After hours the laboratory will fax the “Chain of Custody Form”.
4. If resample indicates adverse quality or exceedance, Water Quality Coordinator to advise the Public Health Department and seek further direction.

6.2.7 **SODIUM (O. Reg. 170/03, Section 17-13)**

1. Resample and test as soon as reasonably possible. Sodium sampling must follow the Work Instructions “Procedures for Sodium Sampling”
2. Resampling must consist of one (1) sample collected at the affected site.
3. The Water Quality Coordinator must complete a “Chain of Custody Form” and deliver all samples immediately to the laboratory.
4. If resample indicates adverse quality or exceedance, the Water Quality Coordinator to advise the Public Health Department and seek further direction.

6.3 DELIVERY OF SAMPLES

A Waterworks Operator must deliver all samples to the laboratory immediately. On weekend/after hours, A Waterworks Operator must communicate with laboratory's security guard, identify themselves and request permission to put the samples into the laboratory refrigerator.

6.4 REPORTING RESAMPLE RESULTS

6.4.1 No Adverse Result

1. Waterworks to complete section 2 (b) of MOE Form #4444e and fax with resample results within 7 days of resolution to:
 - a) Region of York Public Health Department (Fax # 1-905-895-3166).
 - b) MOE - SAC, Fax # 1-800-268-6061 or # 416-325-3000Waterworks will also include all documentation with respect to communication between Region of York, City of Toronto in the Issue of Resolution.
2. Resample results indicated NO adverse quality or exceedence, Waterworks to resume normal operation.

7.0 **Associated Forms / SOPs**

- Maintenance SOP
- WI – Watermain Flushing Procedure for Maintenance of Chlorine Residual
- WI – Procedures Microbiology Sampling & Combined Chlorine Residual for Existing Water Distribution System
- Town of Markham Sampling Locations (Map)
- DWSR Form – MOE Publication # 4444e

8.0 **Records**

- Customer Service Request
- Work Order
- Chain of Custody Form
- Laboratory Result
- DWSR Form – MOE Publication # 4444e



Markham Distribution System
DWQMS STANDARD OPERATING PROCEDURE

9.0 History of Changes

Revision	Date	Description	By
2.0	Mar. 2, 2009	Title, Sections 2.0, 3.0, 4.0, 5.0, 6.0, 7.0	H. Dutaud