



Water Security
Agency 

Permittee Guideline for Self-Managed Waterworks Upsets,
Drinking Water Advisories and Consumer Notifications

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WSA 508

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Background

The Water Security Agency (WSA) is the regulator of the following types of drinking water systems in Saskatchewan:

- all municipal “waterworks systems”;
- municipal wells connected to an underground distribution system;
- any pipeline directly connected to a municipal waterworks;
- any pipelines not otherwise directly connected to a municipal waterworks with at least 15 service connections; and
- any other waterworks with a capacity of 18m³/day or more.

There is the potential for a large number of distribution system water main repairs and/or service disruptions in some of the province’s waterworks. Therefore, it is advantageous to both the WSA and to the waterworks permittee to have in place a process whereby the waterworks permittee may be allowed to self-manage consumer notification for certain categories of waterworks upsets.

By legislative authority, the WSA is the legal entity responsible for both construction and operational permitting requirements, as well as for ensuring compliance with all applicable requirements laid out in *The Environmental Management and Protection Act, 2010* (EMPA 2010) and *The Waterworks and Sewage Works Regulations*.

By means of this guideline, the WSA is not in any way delegating or removing itself from its legal authority to issue Precautionary Drinking Water Advisories, or other measures as legally available through either EMPA 2010 or *The Waterworks and Sewage Works Regulations*, as deemed necessary. However, there is nothing in legislation that precludes a waterworks permittee from providing complementary or alternative consumer notification. The intent of this guideline is to lay out a process whereby the waterworks permittee may be involved to a higher degree in both consumer notification and in, firstly, assessing the severity of waterworks upsets and, secondly, in the developing of appropriate responses to the specific upset.

Definitions

To assist in the interpretation and use of this guideline, the following definitions are provided.

- Self-manage(d) — The issuance of Precautionary Drinking Water Advisories (PDWA) is a mandate of the WSA as per EMPA 2010 and *The Waterworks and Sewage Works Regulations*. There is no legal authority in place for the issuance of public ‘drinking water advisories’ (DWA)* by waterworks permittees of WSA permitted waterworks. A large part of the purpose of this guideline is to set out a process by which waterworks permittees may be recognized by the WSA as meeting specific requirements and operational standards as required by regulation as well as industry-recognized best practices such as AWWA standards. This process, when adhered to, will allow for water main repair and associated activities including public notifications to be accomplished to the satisfaction of the WSA in the best interest of the public. The term ‘self-manage(d)’ is intended to include those resulting practices, procedures, training requirements, oversight considerations, notifications and documentation steps carried out by the waterworks permittee after WSA acceptance of the permittee’s standard operating procedure (SOP). Acceptance of the SOP will then allow the WSA to limit its involvement in the initial assessment of severity for specified types of waterworks upsets, as well as the issuance of a WSA precautionary drinking water advisory in the case of certain outlined waterworks incidents.
- Approved or accepted — The use of these terms in the context of this document refers to a status whereby the developed SOP is deemed to meet the requirements of this document. The WSA’s requirements have been met or satisfied such that the WSA accepts that the permittee has in place required procedures and safeguards to allow for their self-management of certain outlined waterworks upsets including minor distribution system line repairs and the related necessary notifications for a DWA issued by the permittee. The approval or acceptance of the submitted SOPs by WSA indicates that WSA is in agreement with the outlined process by which the permittee may issue and rescind DWAs, allowing the WSA to forgo the need to issue a WSA-authorized PDWA.

*Footnote: Waterworks permittees who develop and submit SOPs that are approved or accepted to self-manage specific waterworks upsets as outlined within this guideline, may choose to title their self-managed notices as follows: drinking water advisory, drinking water notification, or other title as approved within their SOP. Waterworks permittees should not use “Precautionary Drinking Water Advisory” (PDWA), given that title’s link to *The Environmental Management and Protection Act, 2010*.

Purpose

This document was developed with the following primary purpose:

- To outline a process whereby waterworks permittees may develop enhanced SOPs as part of their waterworks Quality Assurance and Quality Control policy (QAQC) and Emergency Response Plan (ERP) to enable the permittee to self-manage consumer notification for certain types of waterworks upsets related to water main depressurizations and minor distribution system repairs. The severity, size of area impacted, and time involved in the incident are factors considered that may allow for the self-issuance of localized DWAs by the permittee or may necessitate the involvement of WSA.
- To outline the requirement that any permittees approved via this protocol must be able to provide and demonstrate a high level of understanding of current drinking water industry operational standards and of accountability and verification in order to give WSA confidence that the waterworks owner is prepared and has sufficient resources to deal with waterworks incidents and/or upset consumer notification on their own, outside the normal required WSA reporting and oversight process.

This process will involve select waterworks permittees as determined by the appropriate WSA Environmental Project Officer (EPO) and their manager; note that this option will not be offered to all waterworks permittees but only to those meeting required criteria as outlined in this guideline. The waterworks permittee will develop and submit to the WSA, SOPs describing their methods and procedures related to issuing and managing their own water notifications / DWAs for certain minor waterworks incidents and/or upsets. These SOPs will be reviewed and approved or accepted as deemed appropriate by the EPO and their manager in accord with this guideline.

By accepting the permittee's SOP, the WSA is acknowledging the permittee's ability to manage the certain noted incidents/upsets to a level that will ensure adequate precautions are taken to ensure the safety of the drinking water supply and that proper interagency and public notifications are occurring.

The resulting developed SOPs shall be appended to the permittee's existing QAQC/ERP documentation as appropriate. Should a waterworks owner or operator not abide by its SOPs, the option to self-manage consumer notifications may be removed.

Scope

The primary scope of this document is restricted to minor distribution system repairs or depressurizations that can be isolated from the rest of the distribution system. The exact boundaries of each will be determined on a case-by-case basis as approved by the reviewing EPO and their manager.

- Note that all waterworks upsets, whether covered by this guideline or not, are required to be reported to the WSA as per S.34 of *The Waterworks and Sewage Works Regulations*.

Waterworks incidents covered by the approved SOPs developed pursuant to this guideline may be reported based on approval by the responsible EPO via email (subject line to indicate community name), by phone contact direct to the responsible EPO, or through the 24-hour Water and Sewage Works Upset Reporting Line at 1-844-536-9494. If at any point the waterworks incident exceeds, or is anticipated to exceed, the scope of what is covered by the developed SOPs, the WSA must be notified immediately by directly contacting the responsible EPO by phone or through the 24-hour upset reporting line; immediate direct reporting must be person to person and not through voice mail or the leaving of other types of non-confirmed messages.

Legal Authority

Section 41(1) of *The Waterworks and Sewage Works Regulations* is as follows:

41(1) Every permittee of a waterworks supplying water intended or used for human consumptive use shall have in place a written quality assurance and quality control policy that meets the following standards adopted pursuant to the Adoption of Standards Chapter of the Saskatchewan Environmental Code:

- (a) the *Quality Assurance and Quality Control for Water Treatment Utilities Standard - Drinking Water Quality Management*, EPB 542, as established by the minister on November 15, 2012;
- (b) the *Waterworks Emergency Response Planning Standard*, EPB 540, as established by the minister on November 15, 2012;

- (c) the *Water Quality Emergency Planning Standard - An Overview*, EPB 541A, as established by the minister on November 15, 2012; and
- (d) before commencement of operation of the waterworks, the *Water Quality Contingency Planning Standard*, EPB 540B, as established by the minister on November 15, 2012.

Select waterworks permittees may apply for permission to amend their existing QAQC/ERP as required by Section 41(1) of *The Waterworks and Sewage Works Regulations* to include operational and administrative plans detailing how they will self-manage consumer notification related to specific types of waterworks upsets/incidents. This addendum would be submitted to WSA and, based upon acceptance by the responsible EPO, may be appended to the permittee's existing QAQC/ERP policy.

Eligible Waterworks – Criteria That Must Be Met to be Considered For This Option

Determination of which waterworks permittees may be offered this option will be determined by, but not restricted to, the following factors:

- EPO knowledge and understanding of the waterworks in consultation with their manager;
- Permittee has demonstrated awareness of applicable legislative and drinking water best management practices and standards;
- Permittee can demonstrate that their operators, agents and contractors have been trained in their PTO, QAQC policy, ERP requirements, and their SOP procedures;
- Does the waterworks have a proven history of pro-active, effective and diligent responses to waterworks upsets;
- Presence and functionality of the complete waterworks multi-barrier system;
- Does the waterworks meet or exceed minimum treatment requirements;
- Does the permittee have certified and competent operational and administrative personnel in place;
- Permittee has demonstrated that operations, maintenance and repairs of the waterworks are under the direction of an operator with the appropriate required level of certification;
- Does the waterworks have a history of good water quality results;
- Compliance with *The Waterworks and Sewage Works Regulations* and the waterworks current permit to operate; and
- Reasonable expectation that the waterworks will be able to develop an SOP in accordance with this guideline.

Examples of conditions that must be evaluated when considering a waterworks and may result in the application being denied, or allowance for self-managed consumer notification being disallowed, are as follows:

- Lack of certified operator;
- Lack of sufficient administrative capability;
- Failure to adequately keep daily records; report, document and respond to water works upsets; or review monthly records;
- History of non-compliance with *The Waterworks and Sewage Works Regulations* or their permit to operate; or
- Shortcomings in the waterworks multi-barrier system such as
 - o Minimum treatment requirements not met;
 - o Viable free chlorine residual not present due to inability to meet breakpoint;
 - o High water table that will increase the probability of infiltration during system depressurization;
 - o Common trenching present in the distribution system;
 - o Elevation changes that may magnify the potential for contamination due to backflow within the distribution system.

Guidance in Assessing Water Main Break Type and Responses That May be Covered by this Guideline

The WSA recognizes the guidance and industry best practice principles that are laid out in the AWWA C651-14 *Disinfecting Water Mains* (or most recent version) standard and the associated Water Research Foundation study #4307 *Effective Microbial Control Strategies for Main Breaks and Depressurization*. In combination with mandatory compliance to *The Waterworks and Sewage Works Regulations*, the WSA encourages and supports adherence to the above noted standard.

The following Table 1 is adapted from the Water Research Foundation project #4307 and has been adapted to ensure that compliance with *The Waterworks and Sewage Works Regulations* and applicable provincial guidelines and standards are not compromised. Note that Table 1 is provided as a suggested method of assisting in categorizing break types and appropriate responses; the permittee in their SOP may choose to alter or propose stricter responses to break types based upon WSA acceptance.

In the event of any uncertainty or interpretation, the requirements as laid out and required in *The Waterworks and Sewage Works Regulations* issued pursuant to *The Environmental Management and Protection Act, 2010* or the waterwork’s current permit to operate prevail.

Section 38 of *The Waterworks and Sewage Works Regulations* is as follows:

38 Every permittee of a waterworks supplying water for human consumptive use or hygienic use shall cause samples of water from any part of the waterworks, including the distribution system or any portion of the distribution system, that is new, altered, extended or repaired to be analysed for bacteria in an accredited laboratory as soon as possible after the completion of the new waterworks or the alteration, extension or repair.

Bacteriological testing with associated disinfectant residual and turbidity measurement is required as per S.38 noted above.

As noted in the WRF project #4307 on page 6, when discussing distribution system breaks with loss of pressure,

“Managing contamination risks for breaks in this category must take into consideration the potential of contamination from offsite back-siphoning from undetected pipe leaks or reverse flow from customer services.”

An additional consideration when dealing with distribution system leaks with loss of pressure is the potential for pipe collapse due to negative pressure.

Table 1: Main break types and responses

Type 1 Break	Type 2 Break	Type 3 Break	Type 4 Break
Positive pressure (>20 psi) maintained during break	Positive pressure (>20 psi) maintained during break	Loss of pressure at break site/possible local depressurization adjacent to the break	Loss of pressure at break site/widespread depressurization in the system
Pressure (>20 psi) maintained during repair	Pressure (>20 psi) maintained until controlled shutdown	Partial or uncontrolled shutdown	Catastrophic event/failure
No signs of contamination intrusion	No signs of contamination intrusion	Possible contamination intrusion	Possible/actual contamination intrusion
Procedures	Procedures	Procedures	Procedures
May be self-managed	May be self-managed	May or may not be self-managed dependent on specifics of upset and SOP contents	Type 4 breaks are outside of the scope of this guideline and consumer notification may not be self-managed

Type 1 Break	Type 2 Break	Type 3 Break	Type 4 Break
Procedures	Procedures	Procedures	Procedures
Upset reporting by email allowed	Upset reporting by email allowed	Immediate and direct WSA (Health) notification/ upset reporting required	Immediate and direct WSA (Health) notification/ upset reporting required
Excavate to below break	Excavate to below break	Uncontrolled shutdown	Catastrophic failure response
Maintain pit water level below break	Maintain pit water level below break	Document possible contamination	Document possible contamination
Repair under pressure (>20 psi)	Controlled shutdown ¹	Disinfect repair parts	Shut off customer services in affected area
Disinfect repair parts	Disinfect repair parts	Conduct scour flush (3 ft/ sec for 3 pipe volumes)	Disinfect repair parts
Check residual disinfectant level in distribution system	Conduct low velocity flush (flush 3 pipe volumes)	Conduct slug chlorination (CT of 100 mg/l-min) ²	Conduct scour flush (3 ft/ sec for 3 pipe volumes)
No Drinking Water Advisory (DWA)	Check residual disinfectant level in distribution system and ensure it is adequate	Check residual disinfectant level in distribution system and ensure it is adequate	Conduct slug chlorination (CT of 100 mg/l-min) ²
Bacteriological samples required	Issuance of self-managed Drinking Water Advisory (DWA) — dependent on extent of depressurization ³	Instruct customers to flush premise plumbing upon return to service	Instruct customers to flush premise plumbing upon return to service
	Bacteriological sample(s) required	Self-managed DWA required (dependent on specifics WSA issued PDWA may be required)	Check residual disinfectant level in distribution system and ensure it is adequate
		Bacteriological samples required	WSA issued PDWA (type 4 breaks do not qualify for self-managed DWAs)
			Bacteriological sample(s) required

- Excavation must be completed and pit water maintained below pipe break level prior to and throughout the entirety of the controlled shutdown (depressurization) in order to remain a type 2 break. Failure to maintain pit water level below the break at any point during the Controlled Shutdown (depressurization) will elevate the incident to a type 3 break — uncontrolled shutdown.
- In highly tuberculated pipes, a higher CT should be considered to compensate for possible lower flushing efficiency. Fully achieving a confirmed CT of 100 mg/l-min may not be practical or possible to verify in all cases resulting in heightened attention being given to the subsequent steps as noted within the table above.
- If depressurization is limited to the pipe section, or area flushed or disinfected, then a DWA may not be required. However, if the area of depressurization is larger than the treated (flushed and/or disinfected) area, then a DWA should be considered.

Upset Reporting

All upsets must be reported as per Section 34 of *The Waterworks and Sewage Works Regulations*:

- 34 (1) Every permittee of a waterworks and every employee, agent or contractor engaged by a permittee shall immediately report to the minister any known or anticipated upset condition, bypass condition or event at or affecting a waterworks that could adversely affect the quality of water produced by the waterworks.
- (2) The persons mentioned in subsection (1) shall immediately report to the minister any instance where:
 - (a) disinfection equipment fails;
 - (b) the level of disinfection required by section 27 is not achieved or is not anticipated to be achieved; or
 - (c) on-site water quality testing records are missing.

Upset Condition is defined in Section 2(1)(II) of *The Waterworks and Sewage Works Regulations* as:

- (II) “upset condition” means any abnormal conditions, anomalies or interruptions in the treatment process or the distribution system within a waterworks that may have any adverse effect on the quality of water supplied to consumers;

Waterworks permittees accepted under this guideline may report waterworks upsets that are covered by an approved SOP as per the methods outlined in Table 1 or via direct and immediate contact with WSA. Direct and immediate upset reporting is by phone to the responsible EPO or via the 24-hour upset reporting line. The method and immediacy of reporting is dictated by the type of break as outlined in Table 1. Waterworks upsets that are outside the scope of the SOP must be reported immediately to the responsible EPO or via the 1-844-536-9494 upset reporting line. If there is uncertainty or irregularity in the waterworks upset, or new information becomes available which does or may place the upset outside the scope of issues addressed within the accepted waterworks SOP or may elevate the upset from a type 2 break to a type 3 (or 4) break, then it must be reported immediately to the responsible EPO or via the 1-844-536-9494 upset reporting line.

Suggested Standard Operating Procedure (SOP) Content

The WRF project #4307 (page 11) noted the following aspects of response to water main breaks that could be considered components of a model utility main break response program:

- Risk assessment,
- Main break notification,
- Main break/leak investigation and isolation,
- Pollution prevention,
- Responses to unauthorized discharge of potable water,
- Main break repair,
- Release-to-service criteria after main break, and
- Boil water advisory.

The above listing is provided as a reference point for permittees to consider in the development of their SOPs.

At a minimum, the following topics areas must be addressed:

- Employee and/or contractor training requirements (including documentation/record keeping of specific training materials and quizzes);
- Permittee’s commitments and methods for upset reporting to WSA and Health authorities;
- Internal and external notification procedures (WSA, clients/impacted facilities, Health region), may include door-to-door direct contact, door hangers or other means as appropriate;

- Repair procedures demonstrating adherence to applicable AWWA procedures such as C651-14 *Disinfecting Water Mains*;
- Documentation and record keeping must comply with applicable requirements in *The Waterworks and Sewage Works Regulations*. It is highly recommended that each waterworks upset have its own file or documentation folder containing at minimum, but not restricted to, the following:
 - o Record of notifications as applicable (WSA, Health, impacted users);
 - o Detail on area and facilities impacted;
 - o Water quality test results;
 - o Flushing activities and repair procedures; documentation will need to provide/allow for confirmation that either the procedures within the approved SOP were adhered to and/or that AWWA C651-14 standards were met (performance evaluation forms);
 - o Sign off by certified operator indicating that the work was done under their direction. Note that the certified operator does not need to physically be on site during the repair but needs to demonstrate that the work was done under their direction;
 - o Sign off by the contractor/foreman verifying that the repair was completed in accordance with appropriate SOP and/or AWWA protocol (C651); documentation will need to include water analysis results (chlorine, turbidity, bacteriological) from the localized repair area plus outlying impacted areas as necessary; and procedural details such as chlorine contact times in order to confirm that required CT was met (100 mg/l min, etc.);
- Training requirements and methods demonstrating that all involved employees, agents and contractors are familiar with the PTO and the SOP procedures and requirements; and
- Documentation of process by which the permittee's onsite supervisor/foreman will assess whether the waterworks incident/upset has increased in severity or risk such that increased level of response is required. For example when a type 1 or type 2 no DWA situation progresses to a type 3 or 4 situation which requires a DWA and the immediate notification of WSA.

Summary

Through the permittee's adherence to the process described in this guideline and through the development of appropriate SOPs accepted by the responsible EPO and their manager, the WSA is acknowledging the permittee's ability to manage certain waterworks incidents/upsets to a level that will ensure adequate precautions are taken to ensure the safety of the drinking water supply and that proper interagency and public notification processes are occurring.

Adherence to the AWWA C651-14 *Disinfecting Water Mains* standard in combination with mandatory compliance to *The Waterworks and Sewage Works Regulations* and EMPA 2010 is required. During inspections, EPOs will ensure the accepted SOPs are being followed and the permittee's record keeping is done in a way that enables the EPO to verify compliance with the SOPs.

The intention of this guidance document is to provide a high level of direction to the permittee to develop their own works-specific SOPs, therefore no templates have been developed or provided. This document outlines the necessary information and activities that, at minimum, must be included in an accepted SOP.

There is a significant variance in the management structures and site-specific infrastructure design present throughout the various waterworks in the province. Therefore, the intent is to encourage a degree of variation in the developed SOPs so that they are as practical, relevant and functionally useable as possible for the involved permittees, while at the same time setting a standard of expectation. Having the permittee develop the SOP without a "fill in the box template" also encourages the permittee to be engaged and fully understand the expectations for the proper management of such upsets.