

# System Depressurization

The purpose of this document is to provide further guidance for waterworks owners on the determination and application of requirements for reporting and management of waterworks depressurization upset events. EPB 267 (Upset Reporting at Waterworks/Sewage Works) indicates that a depressurization event is reportable. Also EPB 505 (Bacteriological Follow-up Protocol for Waterworks Regulated by the Water Security Agency) section 2.2 of Appendix B discusses the issuance of PDWAs for depressurization.

The American Water and Wastewater Association standards call for a minimum residual pressure of 140 kPa or 20 psi at ground level at all points in the distribution system. However, system depressurization occurs when any disruption causes a loss of continuous positive pressure to below 20 psi. Several events contribute to the system depressurization, which can be categorized into physical disruption (e.g. line breaks, valve repairs, new construction, etc.) and operational disruption (e.g. pump failure, power outage, extreme fire flows, etc.).

The potential for public health risks associated with depressurized distribution system is directly linked to pathogen contamination, harmful chemical intrusion, and exposure to excess disinfectant residual. For example, pipe breaks provide a potential portal for entry of coliform and viruses from groundwater and surface water into the treated drinking water system. Furthermore, system depressurizations create the opportunity for back-siphoning or backpressure of non-potable water from domestic, industrial or institutional sources, such as sewage effluent, hot water heaters, water reuse systems, and water softeners, which may result in the drinking water contamination.

## What should I do if the system depressurization occurs?

In the event of depressurization due to water main breaks or other physical disruptions in the integrity of a water system, the system is at risk of microbiological contamination. The following procedures should be followed.

- 1 Immediately contact the EPO responsible for the area and any other emergency personnel or agencies that are appropriate for the situation. In the event that the EPO cannot be directly contacted by telephone during regular business hours, report the upset condition to the dedicated Upset Report Line at 1-844-536-9494. Any unique situation such as common trenching, high natural ammonia with groundwater system, high water table, and etc. shall be reported in order to better facilitate decision-making.
- 2 EPO will evaluate the situation regarding the depressurization, as well as historical information including bacteriological results, chlorine residuals, operational history and potential backflow risks. Upon review of above information and in consultation with Regional Health Authority officials, EPO may or may not issue a precautionary drinking water advisory (PDWA) depending on the risk of the event.
- 3 If a PDWA is issued, notify all water users in the affected area utilizing the procedure outlined in the system's Waterworks Emergency Response Plan. Ongoing communication should continue with local radio, TV, newspaper and website announcements until the PDWA is rescinded. Critical water use (health care facilities, restaurants, schools, etc.) should be informed to contact the local Regional Health Authority officials for any additional requirements relating to their ongoing operation.
- 4 Take the necessary measures to restore pressure as soon as possible. Thorough preliminary flushing shall be started once the repairs are completed to remove contamination introduced during repairs. Flushing shall be continued until discolored water is eliminated.
- 5 Properly disinfect the system according to AWWA Standard C651.
- 6 Adequately flush the distribution system pursuant to the velocity and procedures set in the AWWA Standard C651. Water flushing must occur in the direction of unaffected to affected area and remove all of the potentially contaminated water from the unaffected area. Flushing shall be continued until discolored water is eliminated and the chlorine concentration in the

water exiting the main attributed to main disinfection is not higher than the prevailing water in the distribution system or that which is acceptable for domestic use. Contact your EPO if steps 5&6 cannot be performed due to system design.

- 7 Keep the residents and the Water Security Agency advised of the community's progress on the remedial actions or if there is a significant change in public risk.
- 8 Collect two sets of bacteriological samples marked as "other" for total coliform analysis. The two sets of samples should be taken at least one day apart. A set of samples should be collected in the same day from representative locations in the distribution system upon direction from the EPO. The PDWA will remain in effect until the bacteriological safety of the affected portion of the distribution system can be ensured at all times. Additionally, these samples must also meet the requirement for adequate chlorine residual and/or turbidity level specified in your permit to operate a waterworks Appendix A&B.
- 9 Notify affected public of repair and service completion; suggest flushing plumbing, water softeners, water heaters and other water treatment system in homes after the repair is completed.
- 10 Document the system depressurization incident pursuant to section 40(2) Waterworks and Sewage Works Regulations.

In the event of depressurization due to an operational disruption (e.g. pump failure, power outage, extreme fire flow, etc.), it is preferred but may not be possible to disinfect the water system in accordance with AWWA Standard C651. The distribution system should be adequately flushed until the chlorine residual is maintained at an acceptable level. Two sets of bacteriological samples marked as "other" which are representative of the distribution system should be collected as soon as normal operating pressure is regained. The PDWA will remain in effect until rescinded by the Water Security Agency.

#### **What additional measures should I take for those residents located near a dead end without a hydrant?**

Situations arise where residents are located near a dead end piping segment without a hydrant, and flushing of the potentially contaminated water could be done through each homeowner. Please note residents in any low elevation area must be especially vigilant in their flushing efforts because back siphoning may occur at higher elevation areas as water flows towards the lower area. If residents are absent during the depressurization, the residents should still be informed of the requirement and procedure to properly flush their water service and household water line to remove potentially contaminated water in the residential water system. A simple flyer or door hanger posted on the door can serve the purpose.

#### **What happens if my distribution system is periodically below 20 psi?**

Many systems, particularly smaller ones, in the province periodically drop system pressure below 20 psi due to power outage or poor system design. However, often no water problems have been detected in the past which could or have been directly attributable to low pressure. In these cases, PDWAs may still be issued for the sake of public health and safety. For these systems, identifying the cause of periodical pressure drop and progressively resolving the problem is a more proactive approach than being subjected to PDWAs reactively.

It should be noted that low water pressure in a household should not be used to gauge the pressure situation within the distribution system. Low household water pressure situations are commonly due to a partially closed valve on the properties being served and aged galvanized steel plumbing which has become restricted due to interior corrosion and mineral deposit build-up.

#### **Are there any measures I can take to mitigate the risk associated with depressurization?**

Areas that are most susceptible to depressurization include pump station, high-elevation areas, locations with low static pressure, remote location distanced from overhead storage, and areas near dead end. There are a number of mitigation measures that can be implemented in terms of operation and system design such as slow valve closure times, avoiding check valve slam, installation of air vessels, surge tanks, pressure relief valves, surge suppressors, and by-pass lines with check valves. To better identify the critical locations vulnerable to depressurization and develop associated mitigation measures, it is always a good idea to consult with an engineer to come up with an efficient and reliable strategy.

#### **Where can I get more information?**

Additional information on the system depressurization is available from Environmental Project Officers (EPOs) of the Water Security Agency. To speak to an EPO, please call 306-787-0726.

**The Agency's publications mentioned in this fact sheet are available for download at <http://www.saskh20.ca/DWBinder.asp>.**