

CROSS-CONNECTION CONTROL & BACKFLOW PREVENTION

Presentation to the Ontario Backflow Prevention Association

Safe Drinking Water Branch
Drinking Water Management Division
Ministry of the Environment
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Protecting our environment.



Ontario

Background

- Backflow: Flow of non-potable water/other substances into a drinking water system (DWS) that may be caused by back-siphonage or back pressure in the presence of a cross-connection
- Cross-connection: Any actual/potential connection between the waterworks & any source of pollution, contamination or other material/substance that could change the quality of water in a DWS
- Backflow prevention devices: One-way valves installed in plumbing systems to prevent “backflow” of potentially contaminated water/substance(s) into potable DW supply
- Importance of backflow prevention is well known by utilities & stakeholders and they have identified cross-connections/backflow as a potentially significant threat to DWS’s
- Industrial, Commercial & Institutional (ICI) buildings with cross-connection / backflow prevention issues pose the most significant hazard

Background cont'd

- Justice O'Connor:

Water providers should have active programs to detect and deter cross contamination...Distribution systems should have regularly tested backflow prevention valves that can prevent or at least isolate incursions

- Many utilities and stakeholders feel Ontario regulations do not give municipalities enough authority to require/enforce backflow prevention in plumbing connected to their systems
- Ontario Municipal Water Association / Ontario Water Works Association (OMWA/OWWA) have met with Minister Gerretsen
- Legislative context – Standard of Care
 - Prohibition
 - [20. \(1\)](#) No person shall cause or permit any thing to enter a drinking water system if it could result in,
 - (a) a drinking water health hazard;
 - (b) a contravention of a prescribed standard; or
 - (c) interference with the normal operation of the system. 2002, c. 32, s. 20 (1).
 - Standard of care, municipal drinking water system (January 1, 2013)
 - [19. \(1\)](#) Each of the persons listed in subsection (2) shall,
 - (a) exercise the level of care, diligence and skill in respect of a municipal drinking water system that a reasonably prudent person would be expected to exercise in a similar situation; and
 - (b) act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the municipal drinking water system. 2002, c. 32, s. 19 (1).

Backflow Incidents

- Backflow prevention issue is a potentially significant threat to DWS with 500+ significant backflow incidents documented over the last 30 years in North America (including 40+ in Canada)
 - Stratford, ON, 2005 – carwash cleaning agent entered DWS, approximately 30 000 affected, 19 sought medical attention
 - Regina, SK, 2002 – commercial building, glycol added through hose bibb connected to heat exchanger
 - Guelph, ON, 1997 – petroleum chemical back-siphoned into DWS, approximately 50 000 affected, some without water for up to one week
 - Edmonton, AB, 1992 – plastics plant process water containing potassium hydroxide & calsolene oil
 - Redcliff, AB, 1990 – fertilizer from greenhouse
 - Medicine Hat, SK, 1989 – boiler water containing ethylene glycol
 - Burnaby, BC, 1987 – industrial plant auxiliary water process system (untreated surface water)
 - Vancouver, BC, 1986 – a transmission main breaks, negative pressure permitted back-siphonage of contaminants from numerous sources, water turned green
 - Calgary, AB, 1983 – veterinary office wash water, elevated *E. coli*
- Incidents are often under-reported, and the reasons for under-reporting include:
 - Incident not detected
 - Contaminant not confirmed
 - Short duration of incident
 - Fear of publication/litigation
- United States Environmental Protection Act (EPA) recognizes under-reporting in numerous USEPA White Papers

Cost of Drinking Water Contamination

- The cost of a major drinking water contamination incident can be enormous
 - Milwaukee 1993 (cryptosporidium, 403,000 sick, over 100 dead)
 - Total economic costs - \$96.3 million
 - Walkerton 2000 (*E. coli*, 2,300 sick, 7 dead)
 - Total economic costs - \$64,527,194
 - Statistical Value of Life Costs - \$90.8 million (2002 \$s)
- Stratford, ON, 2005: litigation still pending (owner fined \$75,000)
- USEPA White Papers reference backflow incidents where toilet paper found coming out of residential taps & bodily fluids (including blood) flowed from municipal fountains
- US incidents have resulted in multi-million dollar litigation and loss of confidence by consumers in the utilities abilities

Working Group Members

- As a result of the Stratford incident, MOE, in consultation with MMAH and MCSCS (OFM), has coordinated the Cross-Connection Control / Backflow Prevention Working Group that included representatives from:
 - Ontario Municipal Water Association
 - Ontario Water Works Association
 - Canadian Standards Association
 - Ontario Plumbing Inspectors Association
 - Ontario Backflow Prevention Association
 - Metro Area Plumbing Advisory Committee
 - Various training groups
 - Municipalities
 - City of Guelph, City of Mississauga, City of Toronto, Town of Markham, Region of Peel, Halton Region, Town of Midland, Town of Innisfil, Township of Ramara
 - OWWA members
 - including employees of Oxford County, Town of Goderich & City of Stratford

Working Group – Deliverables & Findings

- MOE committed to working with stakeholders to review backflow issues & develop ideas for reducing frequency/severity of incidents
- Working Group key deliverables
 - Review existing information & determine the need for additional data;
 - Evaluate existing roles/responsibilities of agencies, DWS owners, municipalities and water users;
 - Identify best practices in other jurisdictions (Ontario, Canada, the United States); and
 - Develop ideas/concepts (if necessary) for reducing the frequency and severity of incidents.
- Inter-jurisdictional scan and ongoing discussions with the working group, suggest that clear & consistent program requirements would ease difficulty in developing, implementing & enforcing backflow prevention programs; requirements would need to include:
 - Legal Authority
 - Training & Certification
 - Record Keeping & Reporting
 - Enforcement & Penalties
 - Public Education
- The working group has recognized that cross-connection control / backflow prevention programs are needed and that programs should involve:
 - Measures to eliminate the backflow of contaminants into the water distribution system; and
 - Inspection and maintenance programs (including access rights).

Backflow Prevention & Municipalities

- 92% of municipalities indicate introduction of program would increase water safety
 - Existing standards are inconsistent
 - Only 24 (255) Ontario municipalities have backflow prevention programs requiring installation (including retrofit in existing facilities), maintenance & field testing of backflow prevention devices
- City of Toronto implemented comprehensive backflow prevention program, including retrofit and inspections effective January 1, 2007.
 - Established under authority of City of Toronto Act, program follows same framework developed by working group
- Other proactive municipalities (Guelph, Halton, Kingston, etc.) established programs including retrofit and inspections; programs created through by-laws under the Municipal Act.
 - Many municipalities question their authority under the Municipal Act to pass by-laws authorizing right of entry for inspection/retrofit provisions.

Other Jurisdictions

- Jurisdictional scan indicated that majority of jurisdictions recognize backflow as an issue and have provisions within various code documents

International

- Europe
 - European Committee for Standardization approved the European Standard EN 1717 for protection against pollution of potable water and general requirements for devices to prevent pollution by backflow
- Australia
 - Plumbing Code identifies a multi-tiered system of identifying hazards and the installation of backflow protection is identified through a “suitability of devices” table
- New Zealand
 - 1956 Health Act, 1961 Water Supplies Protection Regulations – building owners to install and maintain backflow prevention devices in new and existing premises, local authorities to cause an inspection at least annually
- Japan
 - Most backflow protection utilized is for high-rise buildings
 - Japanese Water Works Association reviewing U.S. backflow protection methods for possible inclusion in Japan

North America

- United States
 - Federal Safe Drinking Water Act does not specifically address cross-connection control
 - Most states have enacted regulations for cross connection – control and enforcement varies between states and utilities, leading to confusion and inconsistencies
- Canada
 - Alberta - requires devices to be installed in accordance with the latest edition of the AWWA (Western Canada Section). Applies to new construction only (2003 forward), is not retro-active and contains no provisions for on-going inspections. Onus based on the device owner for compliance
 - British Columbia – Building Code (1998) premise isolation for severe hazard facilities, provisions also contained in Operating Permits issued by Regional Health Authorities. Progressive compliance approach
 - Nova Scotia – Approvals to Operate, device installation in accordance with CSA B64 standards for all classes identified within the standard. Progressive compliance approach
 - Quebec – mandated in the Construction and Security Codes, installed based on hazard, contains provision for retrofit, maintenance and inspections

Ontario Building Code

- Building Code provisions to prevent the contamination of the DW supply recently updated to require:
 - That connections to potable water plumbing be designed & installed so that non-potable water/substances that may render water non-potable cannot enter potable water plumbing
 - That backflow preventors be installed where backflow may occur from source of potential contamination into potable water plumbing (source isolation)
 - Premise isolation of new buildings/facilities where potentially high health hazard may be caused by backflow (2006 Amendment)
- Limitations of the Building Code
 - General design requirements to protect users of water within building/property (source isolation),
 - Source isolation requirement can be circumvented by changes made to plumbing once building is occupied (cross-connections)
 - Requirements not always identified/enforced during construction/inspection
 - Code does not currently require the following:
 - Retrofit of backflow preventors in existing facilities
 - Inspection, maintenance or field testing of the devices once installed

Working Group Potential Framework

- The working group has reviewed the information that has been collected and has developed a potential framework for a backflow prevention program
- The purpose of these options would be to:
 - Increase potable water supply system protection and reduce the risk to users and public health;
 - Reduce the number of backflow events
 - Reduce potential system down time and potential incident clean-up costs; and
 - Heighten awareness of the issue and increase consumer confidence.

Next Steps

- The MOE continues to discuss the potential program framework with MMAH and stakeholders for possible policy consideration by the government.

QUESTIONS ?