

TO: MUNICIPAL MANAGER 1992 JULY 21

FROM: ACTING DIRECTOR PLANNING AND BUILDING

SUBJECT: CROSS CONNECTION CONTROL PROGRAM

PURPOSE: TO PROVIDE A RESPONSE TO THE RECENT CORRESPONDENCE FROM ARCTIC AIR CONDITIONING LTD., AND TO RECOMMEND THAT COUNCIL CONSIDER IMPLEMENTING A CROSS CONNECTION CONTROL PROGRAM IN BURNABY.

RECOMMENDATIONS:

1. THAT Council authorize staff to pursue development of a Cross Connection Control Program, including identification of the means available to recover the costs of providing the service, and that this be the subject of a further report to Council.
2. THAT a copy of this report be sent to Arctic Air Conditioning Ltd., 8036 - 13th Avenue, Burnaby, B.C., V3N 2G2.

REPORT

Preamble:

In response to correspondence from Arctic Air Ltd., which appeared on the 1992 June 22 Council agenda, staff was requested to provide a report to Council outlining our need for a Cross Connection Control Program.

What is a cross connection?

"Any actual or potential physical connection between a potable water line and any pipe, vessel, or machine containing a non-potable fluid, such that it is possible for non-potable fluid to enter the potable water system by backflow." (AWWA Cross Connection Control Manual, 5th Edition).

The introduction of non-potable fluids into the water distribution system can have serious health implications for the public, including not only the occupants of the building in which the cross connection occurs, but also occupants of other buildings in the area served by the water distribution system.

Methods of controlling cross-connections:

Air Gap

A separation between the discharge end of a potable water supply pipeline and the overflow rim of an open receiving vessel.

Reduced Pressure Backflow Assembly

Consists of two independently acting spring loaded check valves separated by a spring loaded differential pressure relief valve.

Double Check Valve Assembly

Consists of two internally loaded check valves, either spring loaded or internally weighted.

Pressure Vacuum Breaker Assembly

Consists of a spring loaded check valve and an independently operating air inlet valve.

There are numerous other devices used to protect against cross-connections, however, the three assemblies listed contain "test ports" to facilitate regular tests which are conducted to ascertain that the devices remain in working order.

Current Procedure

Presently, the installation of backflow devices is required by the current edition of the B.C. Plumbing Code on new or altered plumbing systems. When the device installed has test ports, a certification report is submitted to our Plumbing Department, showing that the device is in good working order and is providing the necessary protection.

Burnaby's Plumbing Inspectors are familiar with potable water piping systems and have obtained their Cross Connection Control Certification. Successful completion of the course is now a requirement for employment in the Plumbing Section.

The Plumbing Code does not require a maintenance or ongoing inspection program for new or existing installations, although some of Burnaby's building owners choose to provide maintenance information to the Building Department on a regular basis.

The American Water Works Association publishes documented cases of backflow incidents that have occurred throughout North America. Copies of two such occurrences within B.C. are enclosed (these are samples only, taken from a publication of numerous serious incidents).

During a recent conversation with officials from the City of Victoria, they related their reason for implementing a Cross Connection Control Program.

"Of 8 reduced pressure backflow assemblies that had been installed along the Inner Harbour dockside, 5 of them were found to be inoperable."

Had a complete cross connection control program been in effect, the defects in the devices would have been discovered and repaired before over 50% proved to be faulty.

Proposed Program

A Cross Connection Control Program such as implemented in Vancouver and Richmond is more elaborate than the process currently in place in Burnaby, which regulates only the initial installation. The proposed program not only regulates the installation of a device, but it also makes it necessary for the device to be maintained in good working order.

Outline of a Cross Connection Control Program:

1. A survey is conducted on all buildings where the possibility of cross connections could exist.
2. Appropriate devices are ordered installed, under permit, and reports must be submitted to our Plumbing Section showing the successful test results.
3. Each device must be tested annually and the test results again submitted to our Plumbing Section.

Changes will be required to the Municipality's Waterworks Bylaw to give municipal staff the necessary authority to require compliance with the program. Richmond and Victoria waterworks bylaw changes are enclosed as a reference. (Victoria - Schedule "A", Richmond - Schedule "B").

Preliminary discussions with those cities having a program in place indicates that the anticipated cost to implement a similar program in Burnaby will primarily relate to additional staff required to conduct a survey of all buildings where cross connections may exist and to subsequently manage the program. The number of staff required will be dependent upon the expected time frame for completion of the survey. To conduct the survey in a gradual manner would require one additional senior Plumbing & Gas Inspector at an estimated annual salary of \$52,000.

The City of Victoria implemented the program by having the survey completed by a private consultant through the tender process. The subsequent responsibility for managing the ongoing program remained with City staff. Although further review is required, it is expected that the costs of either option would be similar.

It is anticipated that approximately 10% of expenditures may be recovered through permit and inspection fees directly related to the Cross Connection Program. The remaining 90% of expenditures may be recovered through either an 8% increase in the existing plumbing & gas permit and inspection fees or a 1.5% increase in all permit fees.

The costs to building owners to upgrade their potable water systems would be dependent on the degree of hazards that exist and the size of the device(s) to be installed.

Conclusions:

The documented incidents and the many articles written on the subject of cross-connections have clearly demonstrated the need to provide additional protection of our potable water in the interests of the citizens of Burnaby.

It is the recommendation of the Building Department, Engineering Department, and Environmental Health Department that Council support the concept for a program such as the ones presently in place in Vancouver, Richmond, Victoria, and the one contemplated for Whistler, for implementation in Burnaby.

If Council authorizes staff to pursue such a program, staff will conduct an in-depth review of the manpower ramifications and costs involved together with the means that are available to recover these costs, and report back to Council at a later date.

RJK/GRH: lb
enc.

cc: Director Engineering
Acting Chief Public Health Inspector
Municipal Solicitor


D.G. Stenson, ACTING DIRECTOR
PLANNING AND BUILDING

DATE OF OCCURRENCEMarch, 1986

LOCATIONVictoria, British Columbia

SOURCE OF INFORMATIONVictoria Water Department

SUMMARY:

The domestic water system in the Provincial Museum was contaminated by the backflow of water from an air conditioning/humidifier unit that contained a corrosion inhibitor.

DETAILS:

In March of 1986 the City of Victoria Water Department received a complaint from the Provincial museum that their water "smelled of ether". The odor was a reoccurring problem, with its strongest level being noticed in the early morning.

The inspection of the museum confirmed the odor. By following the water system to the area of the strongest odor, it was concluded that the source was the museum's air conditioning/humidifier unit installed in the basement. The make-up water tank for this unit contained a corrosion inhibitor that smelled like ether. The unit's pump operated at a pressure higher than the city water pressure.

A reduced pressure principle backflow prevention device was ordered installed on the water connection to the air conditioning/humidifier unit and the water system was ordered flushed.

ITEM	13
MANAGER'S REPORT NO.	50
COUNCIL MEETING	92/07/27

DATE OF OCCURRENCEJanuary, 1978

LOCATIONVancouver, British

SOURCE OF INFORMATIONVancouver Water De

SUMMARY:

The contamination of a building's water supply system by high concentrations of copper resulted from the backflow of carbon dioxide gas from a beverage machine.

DETAILS:

On January 18th, 1978 employees of a theater reported that the water in the building had a blue color and a strong "mineral" taste. The problem occurred intermittently and a sample of the water taken that afternoon revealed nothing unusual. However, a sample taken and analyzed the next day was found to contain 245 parts per million of copper. Drinking water standards suggest a limit of 1.0 ppm of copper.

A cross connection inspection found a pressure regulator on a carbon dioxide cylinder used at the beverage bar had malfunctioned, resulting in a large amount of gas entering the domestic water system. The standard ball check valve installed on this type of beverage dispenser was ineffective in preventing backflow.

The carbon dioxide formed carbonic acid, which caused rapid internal corrosion of the copper water piping in the theater.

Although copper is not considered to be a cumulative systemic poison such as lead or mercury, a high concentration in the water supply may cause nausea or discomfort, and in a very limited number of people, an allergic reaction.

ITEM	13
MANAGER'S REPORT NO.	50
COUNCIL MEETING	92/07/27

VICTORIA "A" SCHEDULE

Bylaw No. 82-44

PLUMBING BYLAW

I N D E X

(for convenience only)

ITEM 13
MANAGER'S REPORT NO. 50
COUNCIL MEETING 92/07/27

Section Page
137

Actual Cost Charges	44-46	11-12
Back Flow Prevention	36-37	9-10
Building Sewer not in use	57	15
Capacity of Sewer Extension	35	9
Capping of Building Sewer	57	15
Certificate of Acceptance	30	8
Certificate of Registration	61	16
		(Schedule E)
Cleanout Fittings	47	12
Confines of Drainage System	55-56	14-15
Confines of Plumbing System	58	15
Cross-Connection Control	68	19
		(Schedule F)
Definitions	2	1-3
Drainage of impervious surface	65	18
Drainage of roof or canopy	67	19-20
Duties of Plumbing Inspector	3-5	4
Excavation of street	40	10
Fire Sprinklers	62	17
Frost Protection	72	21
Holding tanks	59-60	15-16
Inspections	25-27	7
Location and Depth of public sewer	39	10
Location of Connection to sewer	35	9
Maintenance of building sewers	49	13
Penalties	73	21
Plans for plumbing work	10-11	4-5
Plumbing contractors	61	16-17
		(Schedule D)
Plumbing permit	6-13	4-5
		(Schedule A)
Plumbing permit fees	15-17	6

(4) Where any subsequent addition to a previously exempt ancillary building increases the roof area more than 40m², the roof shall be drained to a leader, the leader shall be connected directly to the building storm drain or storm sewer which serves the property.

CROSS-CONNECTION CONTROL

68. (1) Where any cross-connection control device is installed during any work pursuant to this bylaw or pursuant to the "Water Works Bylaw", it shall be installed in accordance with the standards prescribed in Section 6 of the Plumbing Code.
- (2) The owner of the property on which the cross-connection control device is installed shall ensure that
- (a) the device is and remains in proper working order,
 - (b) when required by the City Engineer, the device is tested by a certified tester of cross-connection control devices and that the test results, including any repairs performed, are submitted to the City Engineer.
- (3) Any results of any test of, or repairs to, any cross-connection control device shall be submitted in the form set out in Schedule F to this bylaw.
69. No person shall deposit or permit or allow the deposit into any plumbing fixture, floor drain interceptor, sump, receptacle, or other device which is connected into any plumbing system or storm drain system anything which may cause damage to any plumbing system or storm drain system.
70. (1) No person shall cause, permit, or allow any storm water to be drained into any sanitary sewer.

SEE SECTION 42

VILKORIH "A"
 SCHEDULE "A"

ByLaw No. 81-127

WATER WORKS BYLAW

I N D E X

(for convenience only)

ITEM 13
 MANAGER'S REPORT NO. 50
 COUNCIL MEETING 92/07/27

	Section	Page
Access by City	13	4
Accounts for water service	29 - 31	8
"At cost" charge	21	6
Connection Fees	35 and Schedules A & B	9
Consumption Charge	26	7
Contamination of water works	16	5
Cross-connection control device	16 - 17	5
Discontinuance by customer	10	4
by Engineer	31	8
deaned	36	9
Establishment of water service	22	6
Failure of meter to register	3-6, 22	2-3, 9
Fire hydrants	33	9
Fire Lines	28	8
Inspection	8 - 9	3
Interference with water works	24	6
Interpretation	18	5
Liability	2	1 - 2
Meter Reading	19	5 - 6
Overload of waterworks	29	8
Penalty	25	7
Powers of Water Commissioner	38	9
Property in water works	9, 30, 34 & 39	3, 8 & 9
Reduction of water works account	23	6
Removal or relocation of water works	34	9
Repair to private service	20	6
Repeal	12	4
Sale or waste of water	40	10
Service charge	14	4
Shut off water wupply	27	7
Temporary water supply	32	8
Turn on water supply	7	3
Turn on fee	32	8
Unauthorized connection	31	8
Unauthorized use of water	15	4
Water main, new	37	9
Work on water works system	22	6
	11	4

- (2) Where any meter is installed pursuant to this section, the owner or occupant of the premises served by the water service shall pay the full service charge and consumption rate as prescribed in this bylaw for a water service other than a fire line.
10. Any customer of the water service may discontinue the service upon application to the Collector.
11. Except as directed by the Water Commissioner, no person, other than a City employee, may do any work of any kind connected with the water works, either the laying of new, or repair of old, services, mains and appurtenances on or under any street or right of way over which the Water Commissioner has jurisdiction.

RESPONSIBILITIES OF THE CUSTOMER

12. At his own expense, any customer of the water service or any owner of premises to which the water service is connected shall keep any service pipes, stop cocks, and other plumbing fixtures on the premises in good repair and order.
13. Upon reasonable notice or request, the Water Commissioner or any person authorized by him for the purpose shall have free access at proper hours of the day to any premises to which water is delivered.
- 14.(1) Without the prior permission of the Water Commissioner, no person shall sell, give, or convey any water beyond the premises connected to the water service.
- (2) No person may wilfully waste any water or use any water for powering machinery or for any other use which the Water Commissioner deems extraordinary.
15. No person shall connect or allow to remain connected any apparatus, fitting, or fixture which may cause noises, pressure surges, or any other disturbance which may, in the opinion of the Water Commissioner, result in annoyance to any other customer, damage to any private service pipe, or damage to the water works system.
- 16.(1) No customer or person shall connect, cause to be connected, or allow to remain connected, any piping, fixture, fitting, container or appliance in a manner which, under any circumstances, may allow water, waste water, or any harmful liquid or substance to enter the water works system.
- (2). Where any condition is found to exist which, in the opinion of the Water Commissioner, is or may be contaminating the water works system, the Water Commissioner may

continued on page 5

- (a) shut off any service;
 - (b) give notice to the customer to correct the fault within a specified period; or
 - (c) direct that a cross-connection control device be installed on any private service pipe, at the customer's expense.
- (3) Where any person fails to comply with any notice given pursuant to this section, the Water Commissioner may shut off any water service.
- (4) Any cross-connection control device installed pursuant to this section shall be approved by the Water Commissioner and the customer shall pay an "at cost" installation and connection fee as set out in Section 21.

- 17.(1) Where any cross-connection control device is required, the device shall be approved by the Water Commissioner.
- (2) Any cross-connection control device installed becomes the responsibility of the customer or owner of the premises, who must ensure that the device remains in proper working order.
- (3) Any customer for whom, or the owner of any premises on which, a cross-connection control device is installed shall ensure that the cross-connection control device is tested by a certified tester of cross-connection control devices and that the test results, including repairs performed, are submitted to the City, as directed by the Water Commissioner.

- 18.(1) No person shall tamper or interfere with the water works system.
- (2) Except as authorized by the Water Commissioner or this bylaw, no person may connect to or operate any pipe, valve, meter, hydrant, or any other part of the water works system.

OPERATION AND INSPECTION

- 19.(1) Neither the Water Commissioner nor the City shall be liable for damage caused by the breaking of any service pipe or attachment, or for any shutting off of the water for the purpose of repairing, maintaining, or cleaning the pipes, provided that where the water is to be shut off for more than six hours notice of the City's intention to shut off the water shall be given.

RICHMOND SCHEDULE B

29. Prevention of Contamination

(a) No customer or person shall connect, cause to be connected, or allow to remain connected, any piping, fixture, fitting, container or appliance in a manner which, under any circumstances, may allow water, waste water, or any harmful liquid or substance to enter the Corporation's water system.

(b) If a condition is found to exist which, in the opinion of the Engineer is contrary to the provisions of Subsection (a), the Engineer may either:

(1) shut off the service or services, or

(11) give notice to the customer to correct the fault within 96 hours, or a specified lesser period, and if the customer fails to comply with such notice, the Engineer shall proceed in accordance with Sub-section (1) of this Section. Without prejudicing the aforesaid, the Engineer may allow cross-connection control devices to be installed on the service pipe on Corporation property. The device and installation is to be approved by the Engineer and installed "at cost", in accordance with Section 37 hereof.

The water service pipe shall not be turned on at the curb stop for occupancy use until the private plumbing system has been approved by the Corporation Plumbing Inspector and has been inspected for cross-connections.

This shall not prohibit the use of a water service for construction purposes for a limited time, provided the Engineer is satisfied that adequate provision is made to prevent backflow into the Corporation's water system. No new water service for any building, irrigation system, sprinkling system, will be given to a customer unless the Engineer is satisfied that cross-connections do not exist, or unless a permit is obtained at the Permits and Licences Department for the installation of an approved cross-connection control device. The said device installation must then be inspected and approved by the Plumbing Inspector.

Where a cross connection control device is required the said device shall be approved by the Engineer. The approval shall be based on the devices conforming to American Water Works Association C506 - 78 and Canadian Standards Association B64 - 1976 or latest revisions thereof, and the successful completion of an Engineer approved one year field evaluation program. All cross-connection control devices are the responsibility of the customer, who must ensure that the devices are in proper working order. These devices are to be tested by a Certified

continued on page 12

Tester of Cross-Connection Control Devices, and the test results, including repairs performed, submitted to the Corporation at regular intervals as directed by the Corporation.

143

30. Interconnected Service Pipes

(a) The Engineer may require that the water piping within premises served by two or more service pipes for similar uses shall be interconnected.

(b) The customer shall, if the premises are supplied by two or more services and these services are interconnected within the premises, install and maintain check valves of a type approved by the Engineer on all private service pipes in such locations so as to prevent backflow from any private service into the Corporation's water system.

31. Provision for Special Requirements

Customers depending on a continuous and uninterrupted supply of water or having processes or equipment that require particularly clear or pure water shall provide such emergency storage, over-size piping, pumps, tanks, filters, pressure regulators, check valves, additional service pipes, or other means for a continuous and adequate supply of water suitable to their requirements.

PART IV - OPERATION AND INSPECTION

32. Supervision by Corporation

(a) No work shall be done by the Corporation upon the premises of any customer.

(b) The Corporation shall have the right, by its employees and officers, to supervise all work to be done by the customer in connection with water services; provided, however, that the Corporation shall not be liable for the manner in which any work is done privately on such premises.

ITEM 13
MANAGER'S REPORT NO. 50
COUNCIL MEETING 92/07/27