

School Districts in British Columbia have millions of dollars invested in their buried infrastructure systems. Inspection and maintenance of the infrastructure is a key asset management tool that School Districts use to protect this investment.

As part of the management program, Levelton Consultants Ltd. has a long history in assisting School Districts inspect and maintain the secondary natural gas piping system infrastructure using gas leakage test programs to cathodic protection corrosion prevention.

The gas leakage survey consists of testing the gas piping for leaks from the school side of the gas meter, to the various buildings on the property. Both exterior aboveground piping and underground lines are checked for leaks. When a leak is found, the exact location is pinpointed and identified.

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## Aboveground/Underground Leaks

Aboveground leaks usually occur at fittings. The leaks are identified with coloured markings on the fittings. Repairs are then affected by the District's gas fitter at a later date.

Underground leaks are accurately located by tracing the route of the gas pipe using electronic locating equipment and testing for gas using a flame ionization gas detector. When a leak is found, holes are punched in the soil and tested to locate the highest concentration of gas using a Scott Model D15 gas tester.

The information is detailed in a report to the District. The District can then proceed with repairs by excavating the pipe, shutting down the gas system, and then welding a patch, replacing a section of the pipe or installing a clamp over the corrosion leak.

The gas piping must be electrically isolated at each building riser pipe with a dielectric fitting such as an isolation union or flange. Electrical isolation of the piping ensures that the gas pipe is not electrically connected to other buried metallic utilities such as electrical grounding grids or water mains. These utilities are not normally cathodically protected and will drain cathodic current from the gas pipe, rendering the gas pipe's cathodic protection system ineffective.



The cathodic protection survey consists of the measurement of pipe-to-soil potential readings at all locations downstream of the meter, where the piping comes above ground to service a building. The potential readings determine the status of cathodic protection on the gas piping. According to applicable industry standards, the pipe-to-soil DC potential must be more negative than  $-850$  millivolts (mV) to a copper/copper sulfate reference electrode.



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If the potential on the gas pipe indicates that the level of protection is inadequate, we inspect and test the isolation fittings at each riser using a radio frequency test instrument to determine whether the fitting is electrically shorted.

According to the Gas Safety Act, B.C. Gas Code Clause 5.15.15, all gas piping laid underground shall be cathodically protected regardless of the pressure. In addition, Clause 5.15.19 states that all piping shall be electrically isolated from all other piping by means of suitable electrical insulating fittings. If the piping is not protected, it is in contravention of the Gas Code.

If there is no cathodic protection on a gas pipe, the School District is responsible for seeing that the pipe is electrically isolated and magnesium anodes are installed on it.

Levelton Consultants Ltd. has been providing these services to School Districts for the past 20 years. The following is a list of school districts that have conducted natural gas leakage and cathodic protection surveys and in most instances upgraded the cathodic protection systems by installing dielectric unions and anodes as a result of the surveys:

### List of School Districts

School District No.	School District
23	<i>Kelowna</i>
34	<i>Abbotsford</i>
35	<i>Langley</i>
36	<i>Surrey</i>
37	<i>Delta</i>
38	<i>Richmond</i>
40	<i>New Westminster</i>
41	<i>Burnaby</i>
42	<i>Maple Ridge</i>
43	<i>Coquitlam</i>
44	<i>North Vancouver</i>
45	<i>West Vancouver</i>

If requested by the School District, Levelton Consultants Ltd. is capable of providing design-build services to upgrade the cathodic protection systems on schools with deficient corrosion protection on the secondary natural gas piping.