



INFORMATION REPORT

TO: Mayor and Members Board of Health	WARD(S) AFFECTED: WARDS 9, 11, 12, 13, 14, 15
COMMITTEE DATE: March 5, 2012	
SUBJECT/REPORT NO: Rural Well Water Quality Report BOH12002 (Wards 9, 11, 12, 13, 14, 15)	
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SIGNATURE:	

Council Direction:

The Rural Well Water Quality Report completes an objective under the Public Health Services priority “Reduce public health risks related to environmental health issues” in the 2011 Public Health Services Management Team Work Plan approved by the Board of Health in May, 2011, and aligns with the Corporate Priority Area of “Create Healthy Neighbourhoods”.

Information:

The purpose of the Hamilton Rural Well Water Quality Report (Appendix A) is to:

- inform private rural water well users about the general quality of the water in rural water wells;
- provide guidance regarding health related water quality tests that they may wish to consider if they want to assess the quality of their well water;
- inform private water well users how to sample and test their well water for bacteria, and;
- indicate where private water well users can get detailed information about well maintenance.

In Hamilton, approximately 15,000 to 20,000 rural residents use their own private well and/or cistern as their source for drinking water. It is estimated that there are up to 10,000 water wells in Hamilton. According to the Ontario Water Resources Act and the Health Protection and Promotion Act, the condition of these water wells and the safety of the water is the responsibility of the well owner.

Generally speaking, the microbiological quality of private residential well water in Hamilton appears to be average when compared to Provincial well water quality data. Between 2004 and 2011, over 31,000 Hamilton well water samples were tested for bacteria. On average, 27% of water samples tested positive for Total Coliform (TC) bacteria, including 5% positive for E. coli. The annual percentage of private residential water wells in Hamilton with unsafe bacteria levels ranged from 30% to 22% from 2004 to 2011. These results are similar to the 2011 Provincial private well water quality data.

Generally speaking, the quality of well water regarding health related chemicals appears to be very good. Since the introduction of the Safe Drinking Water Act in 2002 and the implementation of the Provincial Groundwater Monitoring Network in 2003 there has been a significant increase in the testing of well water quality for health related chemicals. This testing is done at well-based drinking water systems that are regulated under the Safe Drinking Water Act such as municipal residential drinking water systems, schools, child care centres, etc. Out of the 78 different chemical standards for drinking water quality for regulated drinking water systems, only five chemicals have been reported to Public Health Services to be above the Ontario Drinking Water Standards (ODWS):

1. Sodium is the only chemical that appears to be a broad problem for well water quality. In Hamilton, sodium has been reported above the ODWS in 51.6% of wells (33 out of 64 wells).
2. Barium has been reported above the ODWS in 1.2% of wells (2 out of 164 wells).
3. Fluoride has been reported above the ODWS in 8.7% of wells (16 out of 183 wells).
4. Lead has been reported above the ODWS in 2.4% of wells (4 out of 168 wells). However, an investigation by Public Health Services in 2006 found 29% of wells (13 out of 45 wells) in the Kirkwall area had lead levels above the Ontario Drinking Water Standards.
5. Nitrates have been reported above the ODWS in 6% of wells (11 out of 183 wells).

The Hamilton Rural Well Water Quality Report (Appendix A) will be mailed to rural Hamilton residents who use a water well and/or cistern for their source of drinking water in recognition of World Water Day on March 22, 2012. A hardcopy of the Report will be made available where water sample bottles are obtained and it can be accessed on line by visiting the Public Health Services Safe Water Program website www.hamilton.ca/safewater.

The Ontario Public Health Standards (OPHS) are published by the Minister of Health and Long-Term Care under the authority of the Health Protection and Promotion Act. It specifies the mandatory health programs and services provided by Boards of Health. The 21 protocols in the OPHS are specific documents that direct how Boards of Health must operationalize specific requirement(s) identified within the OPHS. The purpose of the Drinking Water Protocol is to prevent and reduce the occurrence of water-borne illness related to drinking water. The Hamilton Rural Well Water Quality Report (Appendix A) will be shared with rural well users in order to achieve the following components of the Safe Drinking Water Protocol under the OPHS:

- inform the public about unsafe drinking-water conditions and provision of the necessary information to respond appropriately;
- engage in activities within the community that increase the safety of drinking water and decrease potential for adverse effects on health, including but not limited to, participation on technical committees and assistance in the identification of vulnerable areas and threats to drinking water systems;
- ensure the availability of information and/or educational material on safe drinking water practices to private citizens, water haulers, and owners and operators of drinking water systems required to provide potable water under the Health Protection and Promotion Act;
- provide, upon request:
 - assistance in the interpretation of water analysis reports, and
 - information on potential health effects and appropriate response to adverse results or adverse observations;
- make available for owners of unregulated drinking water systems sample bottles, forms and information provided by the Public Health Laboratories to encourage sampling and testing of those unregulated drinking water systems.

Annually, Public Health Services mails information to rural well water users in recognition of World Water Day and issues a media release, inviting local Media to a rural well to discuss well water quality and testing. Drinking water related information is available by visiting Public Health Services Safe Water Program website www.hamilton.ca/safewater and by phoning the Safe Water Information Line 905-546-2189. Previously, Public Health Services reported on rural well water quality and the Safe Water Program in Report BOH07040.

Appendix

Appendix A to Report BOH12002 - Hamilton Rural Well Water Quality Report.

Hamilton Rural Well Water Quality Report March 2012

If your drinking water comes from a private well, this report is for you!

You will find information on:

- how to test the quality of your well water to make sure it is safe to drink;
- health related concerns with well water in Hamilton, including bacteria and other chemicals of concern;
- results from studies on Hamilton well water quality;
- how to maintain your well and prevent contamination of your water, and;
- a list of well water information resources.



Overview

In Hamilton it is estimated that approximately 15,000 to 20,000 rural residents use their own private well and/or cistern as their source for drinking water. In Hamilton that could be up to 10,000 water wells. The condition of these water wells and the safety of the water is the responsibility of the well owner. This typically is the property owner.

This report does not apply to drinking water systems regulated under the Safe Drinking Water Act or the Health Protection and Promotion Act. These include all municipal residential drinking water systems and all non-municipal drinking water systems (schools, daycare centres, group homes, mobile home/trailer parks, restaurants, arenas, churches, etc). These systems are regularly monitored. Drinking water quality reports for municipal drinking water systems are available from Hamilton Public Works at www.hamilton.ca/water. Reports for non-municipal drinking water systems are available from the owners of these water systems.

Generally speaking, the microbiological quality of private residential well water in Hamilton appears to be average when compared to Provincial well water quality data. Between 2004 and 2011, over 31,000 Hamilton well water samples were tested for bacteria. On average 27% of these water samples were unsafe for drinking due to the presence of bacteria, with 22% of water samples having significant levels of Total Coliform bacteria present and 5% having *E. coli* present. The annual percentage of private residential water wells in Hamilton with unsafe bacteria levels ranges from 30% to 22 % from 2004 to 2011. These results are similar to the 2011 Provincial private well water quality data; 20.4% of water samples had significant amounts of Total coliform bacteria and 4.3 % had *E. coli* present.

Generally speaking, the quality of well water regarding health related chemicals appears to be very good. Since the introduction of the Safe Drinking Water Act in 2002 and the implementation of the Provincial Groundwater Monitoring Network (PGMN) in 2003 there has been a significant increase in the testing of well water quality for health related chemicals. This testing is done at well-based drinking water systems that are

regulated under the Safe Drinking Water Act, such as municipal residential drinking water systems, schools, child care centres, etc. Out of the 78 different chemical standards for drinking water quality for regulated drinking water systems, only five chemicals have been reported to Public Health Services to be above the Ontario Drinking Water Standards:

1. Sodium is the only chemical that appears to be a broad problem for well water quality. In Hamilton, Sodium has been reported above the Ontario Drinking Water Standards in 51.6% of wells (33 out of 64 wells).
2. Barium has been reported above the Ontario Drinking Water Standards in 1.2% of wells (2 out of 164 wells).
3. Fluoride has been reported above the Ontario Drinking Water Standards in 8.7% of wells (16 out of 183 wells).
4. Lead has been reported above the Ontario Drinking Water Standards in 2.4% of wells (4 out of 168 wells). However, an investigation by Public Health Services in 2006 found 29% of wells (13 out of 45 wells) in the Kirkwall area had lead levels above the Ontario Drinking Water Standards.
5. Nitrates have been reported above the Ontario Drinking Water Standards in 6% of wells (11 out of 183 wells).

Bacteria Testing – It's Free!

Rural residents who own or use a well or cistern can test their drinking water for bacteria for free.

Water samples are tested for Total coliform bacteria and *E. coli* bacteria. These bacteria are referred to as "indicator bacteria" because they "indicate" if harmful microorganisms (bacteria, viruses, or parasites) are present. If these indicator bacteria are in your water it means that there could be harmful microorganisms in your drinking water that can make you sick.

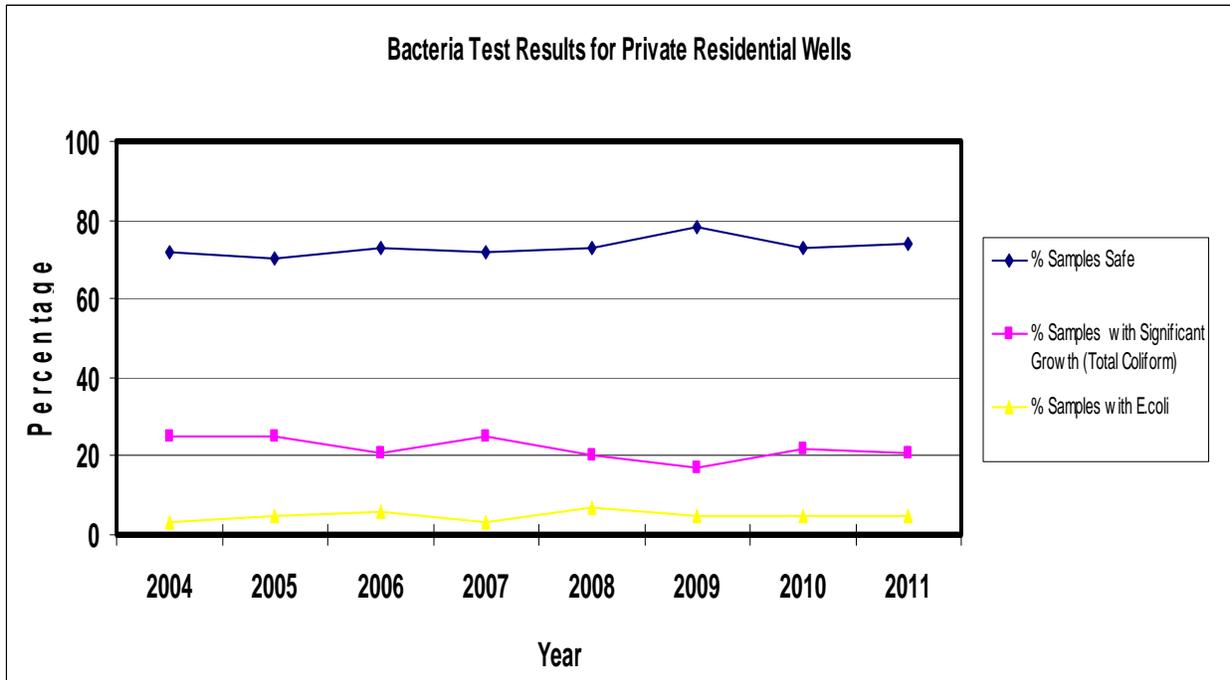
What does the well water quality look like in Hamilton?

Since 2004, on average 27% of private well water samples were potentially unsafe to drink. Of these, 22% of water samples had significant amounts of Total coliform bacteria present and 5% had *E. coli* present. These results are similar to the 2011 Provincial private well water quality data where 24.7% of private well water samples tested were potentially unsafe to drink. Of these, 20.4% of water samples had significant amounts of Total coliform bacteria present and 4.3 % had *E. coli* present.

The chart below displays private residential well water bacteria test results from 2004 to 2011:

- On average 3 of 4 (73%) of the lab test results from private well (or cistern) water samples were safe for drinking. The annual range is between 70% to 78 %.
- Approximately 1 out of 4 (27%) private well (or cistern) water samples tested as potentially unsafe for drinking.

- 22 to 25% of water samples had significant amounts of Total coliform bacteria detected.
- 3 to 7% of well water samples had E. coli detected.



What does this mean?

Total Coliform bacteria are a general family of bacteria found in animal wastes, surface soils and vegetation. This is an early warning that there is surface water contamination in your well.

E.coli bacteria are a group of bacteria found in the intestines of warm blooded animals. If E. coli bacteria are in your well water this means that there is animal or human sewage contamination from a nearby source, including septic systems.

How can you check if your well water is bacteriologically safe to drink?

If you have not tested your well water for over a year, it is recommended that you test right away. Begin your testing program by taking 3 water samples at least 1 week apart. If you have water treatment devices attached to your plumbing, you can submit two drinking water samples; one from a tap/faucet used as a source of drinking water and the other from a raw water source (before any treatment systems). This will tell you the level of bacteria in your tap water and in your well.

After your initial testing, it is recommended that you test your well at least 3 times a year. The best times are after spring melt, in mid-summer and once in the fall. The quality of your well water can be different throughout the year, especially during periods of heavy rainfall.

Once you have submitted your well water sample, you will receive your test results in the mail. The table below tells you what your well water test results mean.

Bacteria	Ontario Drinking Water Standards Interpretation		What does this mean? What should you do?
Total coliform per 100 mL	5 or less	No significant evidence of bacterial contamination	Sample and test your drinking water 3 times, with each sample collected 1 to 3 weeks apart. This will provide a better picture of your well water quality and if you need to take any further action.
<i>E. Coli</i> per 100 mL	0		
Total coliform per 100 mL	more than 5	Significant evidence of bacterial contamination	Stop drinking your well water. It may be unsafe to drink. Examine the well head area and get rid of any potential sources of contamination.
<i>E. Coli</i> per 100 mL	0		Retest your well water. If your results are still the same, disinfect your well. Consider using a different source for drinking water until you have resolved your well water issues. Contact Public Health Services as soon as possible 905-546-2189.
<i>E. Coli</i> per 100 mL	More than 0	Unsafe to drink – animal or human waste contamination	Stop drinking your well water. It is unsafe to drink as there is evidence of animal or human waste contamination. Arrange an alternate supply for drinking water. Examine the well head area and get rid of any potential sources of contamination. Disinfect your well and retest. Immediately contact Public Health Services for your next steps 905-546-2189.

Hamilton Public Health Services has made well water testing as easy as possible. You can pick up well water testing bottles at all Municipal Service Centres and at 6 other convenient locations throughout Hamilton. You can drop off your well water samples at all the Municipal Service Centres, **between Monday and Thursday**. A free booklet about well maintenance can also be picked up at all these locations:

Area	Location	Bottle Pick-Up	Sample Drop-Off
Ancaster	Municipal Service Centre 300 Wilson St. East, Ancaster	Yes	Yes
	Copetown General Store 2012 Governors Rd. Copetown	Yes	No
Dundas	Municipal Service Centre 60 Main St. Dundas	Yes	Yes
	Public Health Services 2 King St. West, 3rd Floor	Yes	Yes
Flamborough	Municipal Service Centre 7 Innovation Drive, Flamborough	Yes	Yes
	Dee's Bakery 1817 Regional Rd. 97, Valens	Yes	No
	Carlisle Post Office Centre Rd., Carlisle	Yes	No
	Rockton Berry Farm 621 Hwy #8, Flamborough	Yes	No
	Lynden Post Office 94 Lynden Rd. Lynden	Yes	No
Glanbrook	Municipal Service Centre 4280 Binbrook Rd.	Yes	Yes
Hamilton	Public Health Services 1 Hughson St. North, 3rd Floor	Yes	Yes
	Public Health Services 1447 Upper Ottawa St.	Yes	Yes
	Public Health Lab 250 Fennell Ave. West,	Yes	Yes
	Hamilton City Hall 71 Main Street West,	Yes	Yes
Stoney Creek	Municipal Service Centre 777 Highway #8	Yes	Yes
	Highland Country Markets 432 Highland Road East	Yes	No

Have you wondered if you should be testing your well water for chemicals?

Hamilton Public Health Services has reviewed well water test results from the following well water sources:

- 50 drinking water systems in Hamilton that are regulated by the Ministry of Environment under the Safe Drinking Water Act.

- Over 100 well-based drinking water systems in Hamilton that are regulated by Public Health Services under the Health Protection and Promotion Act.
- 14 monitoring wells that are part of the Ontario Ministry of Environment's Provincial Groundwater Monitoring Network (PGMN).

Six health related chemicals in Hamilton well water have been reported to Public Health Services at levels near or above the Ontario Drinking Water Standards. A summary table is below. Fact sheets for these chemicals are at the end of this report, including more details about these test results in Hamilton.

Chemical	Ontario Drinking Water Standard	City of Hamilton Well Water Results	Areas Affected in the City Of Hamilton	Public Health Services Recommendations
Arsenic	0.025 mg/L (0.25 ppm)	Zero out of 100 SDWS tested by PHS, 50 systems regulated by the MOE and 14 PGMN wells were above the standard.	1 well with arsenic concentrations slightly below the standard is located on Sulphur Springs Road.	No evidence to indicate that wells need to be tested for arsenic.
Barium	1.0 mg/L (1.0 ppm)	<ul style="list-style-type: none"> • 2 of 50 (4%) MOE regulated well systems tested slightly above the standard • No exceedences in 100 SDWS or 14 PGMN wells 	The 2 wells above the ODWS are in Copetown and are within 3.5 km of each other.	Owners of drilled wells in the Copetown area should consider testing for Barium.
Fluoride	1.5 mg/L	<p>Exceedences:</p> <ul style="list-style-type: none"> • 1 of 14 (7%) PGMN wells • 14 of 119 (13%) PHS tested wells • 1 out of 50 (2%) of MOE regulated wells 	Fluoride can be present naturally in and is more likely to occur at levels above the ODWS in wells drilled into bedrock.	Owners of deep drilled wells should consider testing for fluoride.
Lead	0.010 mg/L (10ppb)	<p>Exceedences:</p> <ul style="list-style-type: none"> • 3 of 104 (3%) SDWS wells tested by PHS • 0 of 14 PGMN wells had lead levels above the ODWS. • 1 out of 50 (2%) of MOE regulated systems • 13 of 45 (29%) of residential wells tested by PHS 	Naturally found in the bedrock in the Niagara Escarpment.	Owners of wells drilled into the Niagara Escarpment should test their well water for lead, especially for wells located in the former Township of Beverly.
Nitrates	10 mg/L (10 ppm)	<p>Exceedences:</p> <ul style="list-style-type: none"> • 2 of 14 (14%) PGMN wells • 4 of 50 (8%) MOE regulated wells • 5 of 119 (4%) SDWS wells tested by PHS 	<p>Shallow or dug wells are at risk, especially:</p> <ul style="list-style-type: none"> • near fertilizer or animal waste application • near old septic tank systems • areas with sandy or gravelly soil 	Owners of shallow or dug wells should consider testing for Nitrates and follow best practices in the maintenance of their well.

Chemical	Ontario Drinking Water Standard	City of Hamilton Well Water Results	Areas Affected in the City Of Hamilton	Public Health Services Recommendations
Sodium	20 mg/L	Exceedences: <ul style="list-style-type: none"> • 11 or 14 (79%) PGMN wells • 22 of 50 (44%) MOE regulated wells 	Naturally occurring sodium is present in many Hamilton wells at elevated levels.	People who need a low salt diet, such as those with high blood pressure, should test their well for Sodium.

The Ontario Safe Drinking Water Act lists microbiological, chemical and radiological standards (Ontario Regulation 169/03 - Ontario Drinking Water Quality Standards). This list includes 78 chemical standards and their maximum concentration in milligrams per litre.

All water samples from regulated wells with test results that are higher than the Ontario Drinking Water Quality Standards are reported to the local Medical Officer of Health and to the Ministry of the Environment.

Dissolved minerals can be present at concentrations high enough to shorten the expected life span of water using appliances (hot water tanks, kettles, irons, etc). Most dissolved minerals are not a health concern, but they are a water quality issue because they affect the taste and odour of the well water. High levels of dissolved calcium, manganese, iron and sulphates and can be treated with water conditioning equipment and make the well water more drinkable and usable for household purposes.

How can I test my well water for these chemicals?

Chemical testing can be expensive. A way to reduce the costs is to **only** test the selected health related chemicals that Hamilton Public Health Services as mentioned in this report.

Most drinking water testing laboratories test chemicals in groups (also referred to as “suites”). These groups can be metals, organics, inorganics, etc. Testing for a group of chemicals may cost less than testing for one or two chemicals. When talking with a testing lab, you should make sure that the chemicals mentioned in this report are included in the group of chemicals you want tested.

How do chemicals get in my well water?

As water flows over ground surfaces and seeps into the soil and bedrock, it dissolves and transports small amounts of minerals and other substances into the groundwater. The concentration of these minerals and substances vary from well to well and over time. They depend on many factors including:

- type of well
- depth of well

- well construction
- well maintenance
- surface water drainage
- nearby land uses
- soil type
- bedrock formations
- mineral content
- seasonal rainfall

The table below lists Public Health Services testing recommendations for your type of water supply.

Water Supply	Testing Recommendations
<p>1. Shallow Wells - dug, bored or shallow drilled wells less than 6 meters deep:</p> <p>Water is usually less mineralized (softer) but more likely to run dry during drought conditions and susceptible to naturally occurring and made-made pollutants. Examples:</p> <ul style="list-style-type: none"> • Bacterial pollutant sources: <ul style="list-style-type: none"> ○ surface water runoff, ○ nearby septic systems, ○ animal waste/manure • Other pollutants used at or near the ground surface <ul style="list-style-type: none"> ○ Nitrates associated with manure, fertilizer and septic system effluent ○ Sodium naturally occurring and associated with road salt or water softener recharge water. ○ petroleum based chemicals, ○ pesticides 	<ul style="list-style-type: none"> • Visually and periodically inspect your well. • Maintain well in sound condition • Direct surface run-off and locate pollutant sources away from well. • Test for Total Coliform and E. coli bacteria 3 times per year. Use free bacteria testing service available through City Of Hamilton Public Health Services • Test for Nitrates especially if infants in household • Test for Sodium especially if occupant(s) is on Sodium restricted diet and uses the water for consumption. • Testing for petroleum and pesticides might be warranted if signs of potential contamination are observed, such as odours, changes in water colour, nearby spills, etc.

Water Supply	Testing Recommendations
<p>2. Deep Wells - drilled wells more than 6 meters:</p> <p>Water from deeper sources is usually more protected from surface pollutants and less susceptible to water shortages during drought conditions. Deeper water sources are usually more mineralized (harder) due to longer contact with a wider variety of minerals found in bedrock.</p> <ul style="list-style-type: none"> • Hamilton area bedrock is fractured limestone. Water quality is generally good but tends to be hard and can have taste, odour, and colour problems due to dissolved calcium, sulfur, manganese, iron, etc. • Health related chemicals occur naturally and sporadically. Testing of well water in Hamilton shows that most likely health related chemical parameters to exceed the Ontario Drinking Water Standards are sodium, lead, fluoride, nitrate, and barium. 	<ul style="list-style-type: none"> • Test for Total Coliform and E. coli bacteria 3 times per year. Use free bacteria testing service available through City Of Hamilton Public Health Services. <p>If testing general chemistry of water from deeper wells, Public Health Services recommends drinking water chemical scan should include the following health related parameters: lead, sodium, fluoride, nitrate, barium.</p>
<p>3. Cisterns - an underground storage tank used to store hauled water:</p> <ul style="list-style-type: none"> • Inspect, repair, and clean annually. • Use municipal water delivered by a water hauler that is inspected by PHS. Confirm with hauler or PHS that they are inspected. • Liners, if used should be made from food grade materials only. • Refer to the following link for a fact sheet on Cistern Maintenance: http://www.hamilton.ca/NR/rdonlyres/3D546028-3202-469C-AEE3-BEE15521723E/0/Cistern_disinfection.pdf 	<ul style="list-style-type: none"> • Test for the presence of Total Coliform and E. coli bacteria 4 times per year by using free test service available through City Of Hamilton Public Health Services. • Cisterns are prone to bacteria contamination. • Disconnect eves trough from cisterns. • Install a water disinfection device such as a chlorinator or Ultra Violet system.

Well Water Information Sources

- **Public Health Services Safe Water Information Line 905-546-2189** to speak with a Health Inspector about health related water test results, water treatment options for health related test results, and well maintenance.
- **Public Health Services Safe Water Website** for information about private water supplies <http://www.hamilton.ca/safewater>

- **Ministry of Health and Long Term Care:** Water safety and Well Water information including a Well Disinfection Instruction Sheet
http://www.health.gov.on.ca/en/public/publications/pub_watersafe.aspx
- **Health Canada:** Information about drinking water quality topics including chemicals:
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/index-eng.php#tech_doc
- **Service Ontario:** regulations for Drinking Water Standards and wells.
 - **Ontario Drinking Water Standards** - Standards for over 150 parameters; applies to drinking water supplies that provide drinking water to the public. Compare your test results to these Drinking Water Standards.
www.e-laws.gov.on.ca/html/regs/english/elaws_regs_030169_e.htm
 - **Wells Regulation** - regulates who can work on a well, well construction, location, and abandonment
www.e-laws.gov.on.ca/html/regs/english/elaws_regs_900903_e.htm
- **Ministry of Environment** provides access to drinking water publications and documents including a Directory of Licensed Well Contractors in Ontario, Requirements and Best practices, Well Record Request form etc. A Water Well Record can provide essential information about a well including construction details, casing depth, water depth, flow rate, recommended pump rate, etc.
<http://www.ontario.ca/ONT/portal61/drinkingwater>
- **Laboratories** The Ministry of Environment provides a list of approved commercial laboratories that test drinking water from small and large drinking water systems. Most laboratories will also test drinking water samples taken from private well/cisterns on the bases of a fee for service.
<http://www.ene.gov.on.ca/en/water/sdwa/licensedlabs.php>
- **Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines** provides basic information on specific drinking water chemical parameters.
www.ene.gov.on.ca/envision/gp/4449e01.pdf
- **Well Abandonment** is City Of Hamilton financial assistance of up to 100% for landowners to decommission a well on their property. Contact Hamilton Conservation Authority and Conservation Halton at 905-336-1158 ext 263 or 905-525-2181 ext 165,181,195 for program details.
- **Well Aware** is an Ontario Ministry of Environment sponsored program that encourages Ontario's residential well owners to protect their wells. This organization can arrange a home visit to help you identify potential risks to your well.
<http://wellaware.ca/>
- **National Sanitation Foundation (NSF)** is an independent certifying organization- lists water treatment devices tested against NSF standards for the removal of various substances from drinking water.
http://www.nsf.org/consumer/drinking_water/index.asp?program=WaterTre

Arsenic Fact Sheet

What is Arsenic?

Arsenic is a naturally occurring element found in the earth's soil and bedrock normally combined with other organic and inorganic compounds. Trace amounts of arsenic are found in the environment including food, water, soil and air.

Breakdown and erosion of arsenic containing minerals, agricultural run off, mining operations and industrial processes are all potential sources of arsenic in surface and ground water. Trace amounts of are generally higher in groundwater than surface water sources of drinking water.

What levels of Arsenic are allowed in Drinking water?

The Ontario Drinking Water Quality Standard for arsenic is 0.025 mg/L. This standard is mandatory under the Ontario Drinking Water Standards for public water supplies and is used as a recommended limit for private water supplies. Health Canada has lowered the Canadian Drinking Water Quality guideline to 0.010mg/L and Ontario is currently reviewing this recommended revision.

What is known about the levels of Arsenic in well water in Hamilton?

Public Health Services tested the concentrations in the water at 100 Small Drinking Water Systems (SDWS) in Hamilton, none had arsenic above the Ontario Drinking Water Standard (ODWS). Arsenic levels were detected near the ODWS at one SDWS, this water source is the "Sulphur Spring" located on Sulphur Springs Road, Ancaster. Arsenic was detected in 25% of the SDWS tested with concentrations between 0.001 to 0.020 mg/L, averaging 0.006 mg/L. Arsenic levels above the ODWS have not been reported to Public Health Services in any wells in Hamilton. There is no evidence to indicate that private residential wells need to be tested for arsenic.

What are the health effects of high Arsenic levels?

Drinking water with arsenic levels near the arsenic standard every day is unlikely to cause illness. Health effects from consuming drinking water with concentrations of arsenic significantly above the standard for long periods of time may increase the risk of cancer of skin, lungs urinary bladder, and kidney. Short term exposure to very high levels of arsenic can result in abdominal and muscular pain, diarrhea and vomiting, skin rash and numbness.

Reducing exposure

You might want to consider testing your private well water supply for the presence of arsenic if your well is located in the Sulphur Springs area. A list of private labs can be found on the Ministry of the Environment website <http://www.ene.gov.on.ca/en/water/sdwa/licensedlabs.php>

If arsenic is above the drinking water standard private well water users should consider a water treatment process such as reverse osmosis or adsorption/ion exchange to reduce the arsenic. The choice of an appropriate treatment depends on source water characteristics and you should consult a water treatment specialist for assistance.

Barium Fact Sheet

What is Barium?

Barium is naturally occurring trace element found in sedimentary rock, such as limestone and dolomite. Barium compounds are used in a many industrial applications in various industries such as electronics, rubber, plastics, textiles, etc. Barium is found in food, air and water. In well water, barium concentrations occur when bedrock or minerals that contain barium compounds dissolve into the groundwater.

What levels of Barium are allowed in Drinking water?

The Health Canada drinking water guideline and Ontario Drinking Water Standard for barium is set at a precautionary level of 1.0 mg/L. This standard is mandatory under the Ontario Drinking Water Standards for public water supplies and is used as a recommended limit for private water supplies.

What is known about the levels of Barium in well water in Hamilton?

Public Health Services tested the barium concentrations in the well water at 100 Small Drinking Water Systems in Hamilton; none had barium levels above the Ontario Drinking Water Standard (ODWS), however, barium was detected below the ODWS in 77% of these wells. Two out of 50 (4%) Ministry of Environment regulated drinking water systems have had barium detected slightly above the ODWS for barium. These are two well-based drinking water systems that use drilled wells. These drinking water systems are located in Copetown and are within 3.5 km of each other. Corrective action has been taken and levels are currently below the ODWS. Barium appears to rarely exceed the ODWS in well water, but is commonly found in well water at levels below the ODWS. Owners of drilled wells in the Copetown area should consider testing their well water for barium.

What are the health effects of high Barium levels?

Health effects depend on the amount and duration of exposure. Adverse health effects reported after ingestion of large amounts of barium include vomiting, abdominal pain, diarrhea, difficult breathing numbness around the face and muscle weakness.

Health Canada has set a No Observed Effects Level (NOEL) for barium in drinking water at 7.0 mg/L as studies have not shown adverse health effects in people who drink water containing barium at that level. Consuming water with a concentration of barium that is slightly above the drinking water standard is not considered to be a health hazard, however, as a precautionary measure, drinking this water should stop until the problem is corrected.

Reducing exposure

Most treatment methods used for water softening can reduce the barium concentration in drinking water. Note however that some water softening processes may also increase the sodium concentration. Please refer to the Sodium fact sheet for more information on sodium.

References: Health Canada; Environmental and Workplace- Barium, 1990.
Province of Ontario- Technical Support document for Ontario Drinking Water Standards, Objectives and Guidelines: PIBS 4449e01, Revised June 2006.

Fluoride Fact Sheet

What is Fluoride?

Fluoride is a naturally occurring element found in low concentrations in nature. Fluoride is used in the manufacture of aluminum, bricks, steel, glass, pottery, production of phosphate fertilizer, etc. Fluoride is deposited in surface water by deposition air borne particles and weathering of fluoride containing soils and in groundwater from leaching from fluoride minerals found in rock formations.

What levels of Fluoride are allowed in Drinking water?

The Ontario Drinking Water Standard for fluoride is 1.5 mg/l. This level is set to protect children age 1 to 4 years old that are most at risk from dental fluorosis (white or brown staining of teeth).

What is known about the levels of Fluoride in well water in Hamilton?

Public Health Services tested the fluoride concentrations in the well water at 119 Small Drinking Water Systems in Hamilton; 14 of 119 (13%) wells tested by Public Health Services had fluoride levels above the Ontario Drinking Water Standard (ODWS). One out of 14 (7%) Provincial Groundwater Monitoring Network wells have had fluoride levels above the ODWS. One out of 50 (2%) Ministry of Environment regulated drinking water systems have had fluoride levels detected above the ODWS. Fluoride can be present naturally and is more likely to occur at levels above the ODWS in wells drilled into the bedrock. Owners of deep (drilled) wells should consider testing their well water for fluoride.

What are the health effects of high Fluoride levels?

Mild dental fluorosis is not considered an adverse health effect. Moderate dental fluorosis can cause an adverse effect based upon a potential cosmetic concern.

High levels of fluoride consumed for a prolonged period of time may lead to skeletal fluorosis. This condition is progressive and results bones becoming more dense and brittle. Skeletal fluorosis has rarely been documented in Canada.

Short-term exceedences above the drinking water standard are unlikely to have an effect on health.

Reducing exposure

Test your well water to determine the naturally occurring concentration of fluoride. Should the fluoride concentration in well water exceed 1.5 mg/l, and consider water treatment to reduce fluoride levels or use an alternate source of drinking water especially if young children are exposed on regular bases.

Point of use unit reverse osmosis and distillation water treatment units can reduce fluoride in drinking water. Look for water filters with this certification on their label: ANSI/NSF Standard No. 58 for reduction of fluoride. Not all systems are equally effective.

References: Health Canada; Guidelines for Canadian Drinking Water Quality: Guide Technical Document-Fluoride (Dec2010)
Province of Ontario- Technical Support document for Ontario Drinking Water Standards, Objectives and Guidelines: PIBS 4449e01, Revised June 2006.
EPA Fact sheet - *Private Well Water and Fluoride*.

Lead Fact Sheet

What is Lead?

Lead is a naturally occurring bluish-grey metal found in small amounts on the earth's outer layer. Lead occurs in bedrock in Southern Ontario in varying amounts and in spotty, unpredictable patterns. This lead was deposited when the bedrock was formed in ancient times. The bedrock under northwestern Hamilton is part of a large rock formation running from north of Hamilton into the Niagara Region. Lead also comes from industrial activities including burning fossil fuels, mining and manufacturing.

What levels of Lead are allowed in Drinking water?

Humans are exposed to lead from water, food, soil and the air. Humans exposed to large amounts of lead may experience adverse health effects. The Ontario Drinking Water Quality Standard (ODWQS) is set by considering total lead exposures from all sources. The ODWQS level for lead is 0.01 milligrams per litre (mg/L) or 10 micrograms per litre (ug/L). This standard is designed to protect young children, who would be most vulnerable to lead. In addition, the ODWQS includes a significant safety margin. If your water has concentrations above or near the ODWQS, it does not necessarily represent a health risk. The Ontario Drinking Water Standards states that the Maximum Allowable Concentration (MAC) for Lead in drinking water is 10 micrograms per litre (ug/l) or 0.01 milligrams per litre (mg/L). This level is based on long-term effects and is therefore applied for average concentrations of water consumed over long periods of time. Short-term consumption of concentrations above the MAC does not necessarily pose risk to human health.

What is known about the levels of Lead in well water in Hamilton?

Public Health Services tested the lead concentrations in the well water at 104 Small Drinking Water Systems in Hamilton; 3 of 104 (3%) wells tested by Public Health Services had Lead levels above the Ontario Drinking Water Standard (ODWS). These were drilled wells located in the western area of the former Town of Flamborough. Zero of 14 Provincial Groundwater Monitoring Network wells have had lead detected above the ODWS. One of 50 (2%) Ministry of Environment regulated drinking water systems have had lead levels detected above the ODWS. This drinking water system is located on the border of the former Towns of Ancaster and Flamborough. In 2006, 29% of 45 private residential wells tested by Public Health Services in the Kirkwall area had Lead levels above the ODWS. A Public Health Advisory was mailed to all rural residents regarding the potential for lead levels above the ODWS in drilled wells located above the Niagara Escarpment. The Public Health Advisory is available at www.hamilton/safewater. Lead is naturally found in the Niagara Escarpment bedrock. Owners of wells drilled into the Niagara Escarpment should test their well water for Lead, especially for wells located in the former Township of Beverly.

What are the health effects of high Lead levels?

Lead can be hazardous to human health. Lead that is inhaled or ingested enters the blood stream, where it is sent to all tissues of the body including the liver, lungs, spleen, kidney, bone marrow and skeleton. Lead can affect almost every organ and system in the body. People who are particularly at risk of lead poisoning include young children, infants and pregnant women.

Exposure to lead is most serious for young children because they absorb lead more easily than adults. Children's brains and nervous system are more sensitive to the harmful effects of lead.

In Canada, short-term exposure to high levels of lead are rare and can cause vomiting, diarrhea, convulsions, coma or even death. Long-term exposure to lower lead levels may cause anemia and damage to the nervous system. Other symptoms are: appetite loss, abdominal pain, constipation, fatigue, dullness, sleeplessness, irritability and headache.

Diagnosis and Treatment:

A blood test is available to measure the amount of lead in your blood. To treat lead poisoning, stopping the exposure is critical. When the lead is removed from a person's environment, it helps decrease the blood-lead levels.

Reducing exposure

Based on the levels of lead found in the Hamilton well water samples, the chance of human health effects is low. Public Health Services is informing well owners and users so that they know the facts, can consider testing their water, and protect their health and the health of their families.

If the source of lead is found in the groundwater, flushing the faucet will **not** be effective. Treatment systems can be used to remove Lead. These include:

- reverse osmosis
- distillation units
- water filters with this certification on their label: ANSI/NSF Standard No. 53 for reduction of lead

Do not heat or boil your water to remove lead. Lead concentration in the water can increase as the water is boiled, as some of the water evaporates during the boiling process.

Do not cook with or drink water from the hot water tap. Hot water dissolves lead more quickly than cold water.

Do not use hot water for making baby formula.

For more information please refer to Public Health Advisory issued by the Medical Officer of Health for the City of Hamilton in 2006 relating to the potential for lead levels above the Ontario drinking water standard in some drilled wells located above the Niagara Escarpment in rural Hamilton by visiting the website:

<http://www.hamilton.ca/HealthandSocialServices/PublicHealth/SafeWater/PrivateWellWaterSupply.htm>

Nitrate Fact Sheet

What are Nitrates?

Nitrate (NO_3) is a compound of nitrogen and oxygen and is found in foods like spinach, lettuce, beets, carrots, meat and meat products and tobacco products. Vegetables account for more than 70% of the nitrates ingested in the human diet. It is also found naturally in the soil and in groundwater. Other common sources of nitrate found in the environment include: municipal and industrial wastewaters, refuse dumps, animal feed lots, septic systems, and runoff or leachate from fertilized agricultural lands.

What levels of Nitrates are allowed in Drinking water?

The maximum acceptable concentration for nitrates in well or municipal water is 10 milligrams per liter (10 mg/L). This standard is mandatory under the Ontario Drinking Water Standards for public water supplies and is used as a recommended limit for private water supplies.

What is known about the levels of Nitrates in well water in Hamilton?

Public Health Services tested the nitrate concentrations in the well water at 104 Small Drinking Water Systems in Hamilton (SDWS); 5 of 119 (4%) SDWS wells tested by Public Health Services were above the Ontario Drinking Water Standard. These were all shallow bored wells. Four of 50 (8%) Ministry of Environment regulated drinking water systems have had nitrates levels detected above the ODWS. Two of 14 (14%) Provincial Groundwater Monitoring Network wells have had nitrates detected above the ODWS. Excessive nitrate concentrations are more likely to be found in shallow or dug wells with nearby sources of nitrates, such as fertilizers, manure, septic systems, and decaying plant material. Areas most susceptible are where there is heavy or ongoing fertilizer or animal waste application; older, higher density rural settlement areas where private sewage systems are used for sewage disposal and private wells are used for drinking water; areas with sandy or gravelly soils or areas with thin soil coverage over bedrock where private sewage systems are used. Owners or users of shallow or dug wells should consider testing for nitrates and ensure their well is properly maintained.

What are the health effects of high Nitrate levels?

Possible effects on the health of children over 6 months of age and adults are still under study. There is some weak evidence of an association between prolonged exposure to moderate levels of nitrates and stomach cancer. Any health risk would not be immediate, but could occur over a long period of time. Any health risk is related to the amount/level of nitrates consumed and the duration of consumption (years).

However, for infants younger than 6 months of age, the health risk is known, immediate and can be fatal. An infant's stomach is less acidic than that of an adult and this allows bacteria to live in the stomach. These bacteria may change the nitrate to nitrite. Nitrite is toxic, combining with red blood cells and preventing them from carrying oxygen to the rest of the body. This condition is called methemoglobinemia, or "blue baby syndrome", and can make infants turn blue from lack of oxygen. Some evidence suggests that a combination of pregnancy and higher nitrates levels in drinking water can increase a woman's chances of methemoglobinemia. While the health risks to pregnant women and the fetus are not definite at this time, drinking water known to have lower levels of nitrates is recommended for the duration of pregnancy.

Reducing exposure

If your well water has high nitrate levels do not use your well water to make infant formula or other infant foods for the first 6 months. Use an alternative source such as bottled water.

Do not boil your water to reduce nitrates. Boiling will concentrate nitrates, increasing levels. Reverse osmosis or distillation devices will remove nitrates. You should consult with the manufacturers of these treatment devices to ensure they remove enough nitrates. Any treated water should be tested to ensure adequate nitrate removal.

Adapted from Wellington, Dufferin, Guelph Public Health Unit.

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Sodium Fact Sheet

What is Sodium?

Sodium is a common element in the natural environment and an essential nutrient required for normal functioning of the human body. Sodium levels in well water may be increased by water softeners, road salting near a well or by low water levels which may concentrate sodium

What levels of Sodium are allowed in Drinking water?

Sodium is not considered toxic and the current drinking water standard of 20 mg/L is based upon an aesthetic objective. A sodium concentration of 200 mg/L will impart a salty taste to the water. Provincial drinking water regulations require that the sodium concentrations in public drinking water systems be tested every five years. When sodium is detected above 20 mg/L (20 ppm) in a drinking water system that is regulated by the Ministry of Environment the sodium levels must be reported to local Medical Officer of Health. The users of the affected drinking water system are notified that the sodium levels in the water are above 20 mg/L, and people with high blood pressure are who are on a sodium restricted diet are advised to consult with their doctor.

What is known about the levels of Sodium in well water in Hamilton?

Sodium levels above 20 mg/L (20 ppm) are not a health concern for the general population. Public Health Services did not test the sodium levels in any wells because it was known that 11 out of 14 (79%) Provincial Groundwater Monitoring Network wells have sodium levels above 20 mg/L and 22 of 50 (44%) Ministry of Environment regulated drinking water systems have sodium levels above 20 mg/L. Sodium levels above 20 mg/L (20 ppm) in well water probably occur often. Sodium in well water can be naturally occurring, related to road salt runoff, or from the discharge of water softener “recharge” water near a well. People with medical conditions such as high blood pressure, hypertension, congestive heart failure, or who follow a sodium restricted diet should test their well water for sodium.

What are the health effects of high Sodium levels?

Sodium is not a health risk to the general user. The tolerable daily intake of sodium that is likely to pose no risk of adverse health effects to the general population is 1500 milligrams for children aged 1-3 years; 1900 milligrams for children aged 4-8 years; and 2300 milligrams for those aged 9 years and up. Sodium from drinking well water is only a part of a person’s daily intake. Below is a list of sodium content in several foods for comparison purposes. Health Canada. *Nutrient Value of Some Common Foods, 2008.*

Food	Sodium (mg)	Food	Sodium (mg)
8 baby carrots	62	1-2% Plain yogurt, 175 ml	127
Swiss chard, 125 ml	165	Cheddar cheese, 50 g	311
Whole wheat bread, 1 slice	184	Haddock, baked/broiled, 75g	65
Toasted oats cereal, 1 cup	219	Egg, 1	47
1% milk, 1 cup	113	Salt, 1 tsp	2373

Reducing exposure

Individuals who have hypertension (high blood pressure), congestive heart failure, or are following a sodium restricted diet for health reasons and use well water for drinking should consider testing their well water for sodium, especially if their water supply system has a water softener or their well is located near a roadway.

For further information regarding dietary sodium intake please call Public Health Services Nutrition and Physical Activity Advice Line 905-546 3630 or EatRight Ontario 1-877-510-5102 to speak to a registered dietitian.

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