

ALBERTA ENVIRONMENT

**Action Protocol for Exceedances of Chemical
Health Parameters in Drinking Water**

September 2009

1. Introduction

Safe, secure supplies of drinking water are essential to Albertans. Alberta Environment regulates waterworks systems that supply water to approximately 3 million Albertans, about 80 per cent of the province's population*. There are many agencies involved in the drinking water program in Alberta, including Alberta Environment, Alberta Health and Wellness and Alberta Health Services. The responsibility of delivering safe drinking water rests with a range of owners and operators of waterworks systems.

These systems are regulated under the *Environmental Protection and Enhancement Act* (EPEA) and the *Potable Water Regulation* and require an approval or registration under a Code of Practice. The approval or the Code of Practice will have conditions that system owners must meet with respect to drinking water quality. The primary objective is to ensure availability of safe drinking water in adequate quantities and quality to the public regardless of seasonal and other challenges of raw water quality.

In addition, Alberta Health and Wellness under the *Public Health Act* also has the legislative authority to ensure the safety of drinking water. It is the Alberta Health Services (AHS) that administers the *Public Health Act*.

The purpose of this document is to outline:

1. the process followed by the Federal/Provincial/Territorial Committee on Drinking Water to develop the *Guidelines for Canadian Drinking Water Quality*;
2. how these guidelines will be implemented by Alberta Environment;
3. how these guidelines are monitored and reported and
4. the protocol to be followed in the event that a non-bacteriological drinking water test result, as specified under an approval or registration, exceeds a health limit (Maximum Acceptable Concentration or MAC) outlined in the *Guidelines for Canadian Drinking Water Quality* or a health limit (Maximum Contaminant Limit or MCL) stipulated in the U.S. Environmental Protection Agency Drinking Water Standards.

The risk to human health is not as immediate as with bacteriological criteria. The risks associated with exceedances of chemical MACs are generally more long-term resulting in chronic exposure health affects but action is still required by Alberta Environment, Alberta Health Services, the system owner, and the operator in the event that the limits are exceeded. It is intended that this document will increase the awareness and confidence Albertans have in the drinking water provided to them by regulated waterworks systems.

* The remaining 20 per cent, or about 600,000 Albertans, receive their water from systems which are exempt from Alberta Environment legislation. Examples of these systems include acreages, farmsteads and First Nations. Drinking water from these systems is monitored according to requirements of the Alberta Health Services and Alberta Health and Wellness or, in the latter case, the federal government.

2. Development of Drinking Water Quality Guidelines

Drinking water quality guidelines are developed through a Federal - Provincial - Territorial Committee on Drinking Water (CDW). The committee consists of representatives from each of the provinces, territories and Health Canada.

The guideline development process involves two distinct phases for each parameter – risk assessment and risk management. In the first phase, which is undertaken by Health Canada, data on the health effects associated with lifelong or long-term exposure to a substance are gathered and evaluated, and options to reduce any perceived risks are developed. Long-term exposure refers to lifelong consumption of water containing a particular parameter. In the second phase of guideline development, the CDW considers, in addition to the health data, the practicability, costs and potential benefits of a particular guideline in light of other health protection priorities, and derives a guideline that is both practicable and protective of health. The supporting technical document for this guideline, prepared by Health Canada, is also peer-reviewed by external experts, and undergoes public consultation.

Once the committee approves a guideline, it is then sent to the CDW's parent committee, the Federal-Provincial-Territorial Committee on Health and the Environment (CHE), for final approval. As soon as the CHE approves the guidelines, the Alberta representative on the CDW will notify the Alberta Environment's (AENV) Municipal Approval staff and Alberta Health and Wellness (AH&W) in writing that a new / revised drinking water quality guideline has been approved by the CHE. Alberta Health and Wellness in turn will pass this message to all the Alberta Health Services (AHS).

Health Canada will post the approved guideline and the supporting technical document on their web site.

3. Implementation of Drinking Water Quality Guidelines

All new and upgraded waterworks systems, whether approved or registered, shall meet the new or revised health-related drinking water quality guidelines that are in effect at the time of approval or registration. However, for existing waterworks systems (approved or registered) that are operating on the date a change or addition is made to the guidelines, the new or revised health-related drinking water quality guidelines will be applied over a period of time specified by the Director (typically within 5 years).

4. Sampling and Reporting of Drinking Water Quality Guidelines

Compliance Sample undertaken by Approval Holder or Registration Holder

The approval holder is required to sample treated water – twice a year for surface water systems for all physical, organic and inorganic chemical and pesticide parameters stipulated in Alberta Environment's Standards. Registered systems, under the *Code of Practice for Waterworks Systems using High Quality Groundwater*, are typically required to monitor once every 3 years for most parameters, and 5 years for organic chemicals and pesticides. Disinfection by-products are monitored annually until monitoring results indicate that the maximum acceptable concentrations are not exceeded, at which time they go to a 3 year frequency.

The approval holder and the registered system owner, at present, would submit the results to AENV as and when they receive the results from the laboratory. An increased number of systems are submitting these results electronically. The results are posted on Alberta Environment's website for access by health officials and the general public.

Until all compliance sample results are posted on Alberta Environment's website, AENV will notify AHS only when a health guideline is exceeded.

5. Action Process

The initial action taken by Alberta Environment will depend on the parameter sample result from the Alberta Laboratory for Public Health and the extent of the exceedance. The flowchart provided below provides a process to determine the most appropriate response.

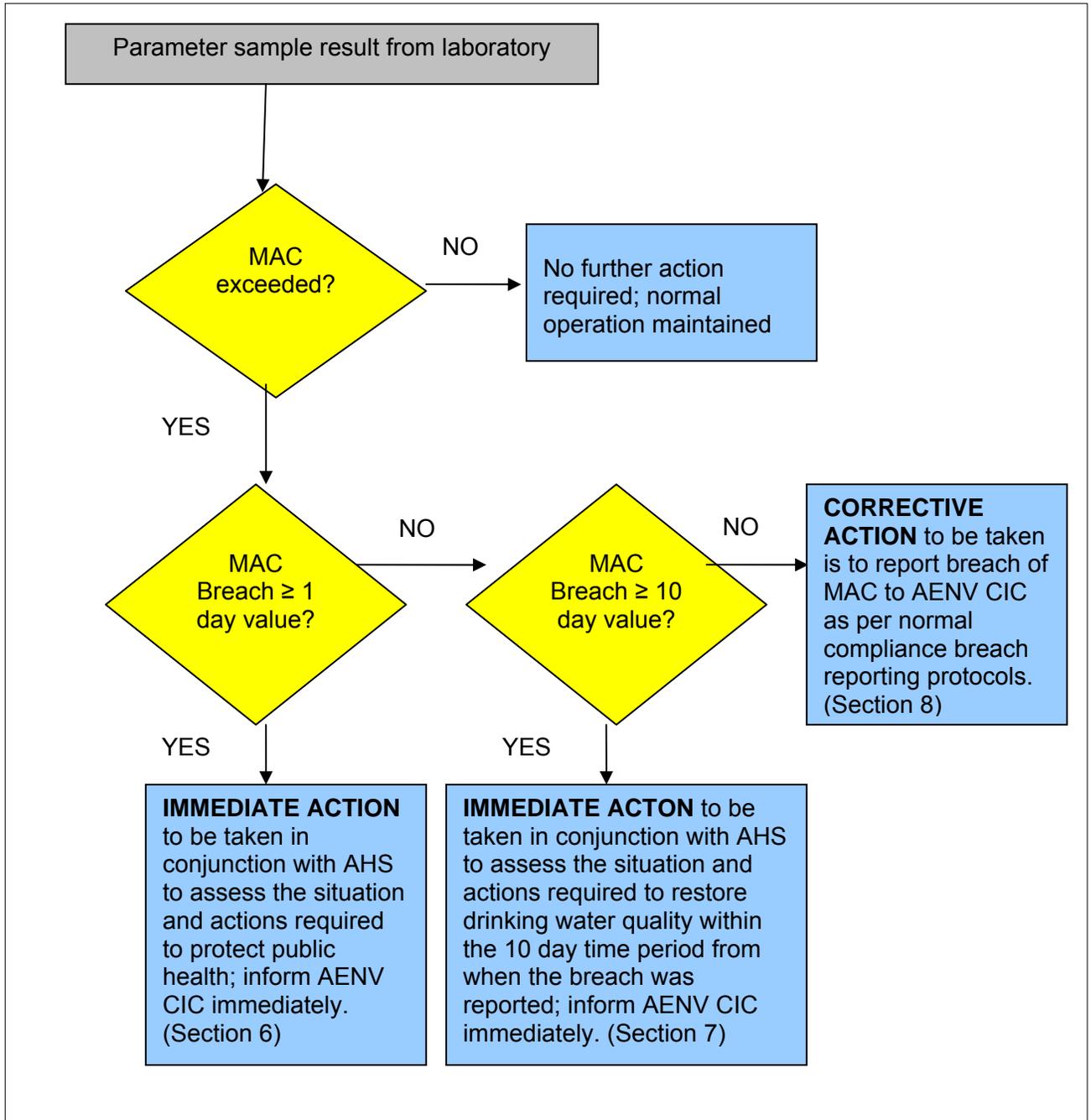


Figure 1

6. Action Protocol When a Chemical Parameter Exceeds the 1-day Short-term Exposure

IMMEDIATE ACTION

The short-term exposure limit is based on the concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for up to one day of exposure. The one-day short-term exposure limit is designed to protect a 10-kg child consuming 1 liter of water per day. Appendix 1 provides a list of parameters and their respective limits.

In the event that the laboratory test results indicate that there is an exceedance of a 1-day exposure limit, the following course of action will be taken:

- The approval or registration holder must contact Alberta Environment (AENV) immediately using the Environmental Hotline at 1-800-222-6514 or 780-422-4505. AENV will note in the comment section of the 'Call Sheet' that this reporting is based on an initial sample.
- AENV will instruct the approval or registration holder to resample immediately. Alberta Environment will also review previous results for the parameter in question to assess if there is a trend to higher values or if the sample is extraordinary.
- AENV will review results of the confirmation sample and if the results are below the MAC, no further action will be taken.
- If the AENV review of results indicates an exceedance above the MAC but not the short-term exposure limit, the protocol for long-term exposure will be followed.
- If the AENV review of results indicates an exceedance above the short-term exposure limit, AENV will contact the appropriate Alberta Health Services (AHS) to advise of the exceedance.
- Based on the chemical parameter, the AHS will issue a "do not consume" or "do not use" advisory to consumers.
- AHS will inform Alberta Health and Wellness that an advisory has been issued.
- AENV will inspect the facility, review the existing treatment process, and work with the operator to determine the cause of the exceedance and if necessary optimize the treatment process.

- AHS will work with the approval or registration holder regarding communication with the public to inform them of the chemical parameter exceeded and recommended precautions or alternative arrangements based on the risk to health until the situation is resolved.
- In the event that there is a need to advise the public of a chemical exceedance, AHS shall develop emergency communication plan. These emergency communications plans should be prepared to ensure that the public is fully advised of the situation without creating undue anxiety. Public advisories should include:
 - a description of existing circumstance;
 - a history of the situation;
 - implications;
 - plans to address the situation; and
 - other relevant information.

7. Action Protocol When a Chemical Parameter Exceeds the 10-day Short-term Exposure

IMMEDIATE ACTION

The short-term exposure limit is based on the concentration of a chemical in drinking water that is not expected to cause any adverse noncarcinogenic effects for up to one day of exposure. The ten-day short-term exposure limit is also normally designed to protect a 10-kg child consuming 1 liter of water per day. Appendix 1 provides a list of parameters and their respective limits.

In the event that the laboratory test results indicate that there is an exceedance of the 10-day exposure limit, the following course of action will be taken:

- The approval or registration holder must contact Alberta Environment (AENV) immediately using the Environmental Hotline at 1-800-222-6514 or 780-422-4505. AENV will note in the comment section of the 'Call Sheet' that this reporting is based on an initial sample.
- AENV will instruct the approval or registration holder to resample immediately. Alberta Environment and the system owner will also review previous results for the parameter in question to assess if there is a trend to higher values or if the sample is extraordinary.
- AENV will review results of the confirmation sample and if the results are below the MAC, no further action will be taken.
- If the AENV review of results indicates an exceedance above the MAC but not the short-term exposure limit, the protocol for long-term exposure will be followed.
- If the AENV review of results indicates an exceedance above the short-term exposure limit, AENV will contact the appropriate Alberta Health Services (AHS) to advise of the exceedance.
- Based on the chemical parameter, the AHS will issue a "do not consume" or "do not use" advisory to consumers.
- AHS will inform Alberta Health and Wellness that an advisory has been issued.
- AENV will inspect the facility, review the existing treatment process, and work with the operator to determine the cause of the exceedance and if necessary optimize the treatment process.

- AHS will work with the approval or registration holder regarding communication with the public to inform them of the chemical parameter exceeded and recommended precautions or alternative arrangements based on the risk to health until the situation is resolved.
- In the event that there is a need to advise the public of a chemical exceedance, AHS shall develop emergency communication plan. These emergency communications plans should be prepared to ensure that the public is fully advised of the situation without creating undue anxiety. Public advisories should include:
 - a description of existing circumstance;
 - a history of the situation;
 - implications;
 - plans to address the situation; and
 - other relevant information.

Note: Where a system has naturally occurring fluoride concentration greater than the MAC of 1.5 mg/L but not exceeding 2.4 mg/L, the system owner shall notify the consumers of the potential public health issues for the target population as directed by Alberta Health Services.

8. Action Protocol When a Chemical Parameter Exceeds the Maximum Acceptable Concentration (MAC) - Long-Term Exposure

CORRECTIVE ACTION

In addition to maximum acceptable concentrations for short-term exposure, there are also maximum acceptable parameters for lifetime exposure. The maximum acceptable concentration [MAC] for long-term exposure is outlined in the *Guidelines for Canadian Drinking Water Quality* and based on a 70 kilogram adult consuming 1.5 litres of water per day during their lifetime. Appendix 1 provides a list of parameters and their respective limits for the MACs.

In the event that the laboratory test results returned to the system owner indicate an exceedance of the maximum acceptable concentration, the following course of action will be undertaken:

- The approval or registration holder must report the exceedance at their facility to AENV using the Environmental Hotline at 1-800-222-6514 or 780-422-4505. AENV will note in the comment section of the 'Call Sheet' that this reporting is based on an initial sample.
- AENV will instruct the approval or registration holder to resample immediately. Alberta Environment and the systems owner will also review previous results for the parameter in question to access if there is a trend to higher values or if the sample is extraordinary.
- In the event that AENV deems that the running average of all samples taken in the 12 month period is below the MAC, AENV will inform the AHS and the approval holder that no further action is required. *[The running average means the arithmetic average of all samples taken in the previous 12 months from the date that the resample was taken, including the resample. The average of the resample and the previous sample will be taken and counted as a single result for that seasonal period. The rest of the samples in the preceding 12 months will also be used to calculate the annual average.]*
- If AENV deems the running average of all samples taken in the 12 month period exceeds the MAC, the following actions will be taken:
 - AENV will note in the comment section of the 'Call Sheet' that the initial and resample confirm exceedance.
 - AENV will inform the AHS and the approval or registration holder;
 - AHS to inform Alberta Health and Wellness;
 - AENV will inspect the facility, review the existing treatment process, and work with the operator to determine the cause of the exceedance and if necessary optimize the treatment process;
 - Resample once system is optimized;

- After optimization, if the running average of all samples taken in the 12 month period does not exceed the MAC, AENV will update the local AHS that no further action is required.
- After optimization, if the running average of all samples taken in the 12 month period exceeds the MAC, AENV will confer with the local AHS and the approval or registration holder to determine a course of action. Action required could include an upgrade of the treatment plant and/or change source.
- AHS will work with the approval or registration holder regarding communication with the public to inform them of the chemical parameter exceeded and recommended precautions based on the risk to health.
- In the event that there is a need to advise the public of a chemical exceedance, each AHS shall develop emergency communication plan. These emergency communications plans should be prepared to ensure that the public is fully advised of the situation without creating undue anxiety. Public advisories should include:
 - a description of existing circumstance;
 - a history of the situation;
 - implications;
 - plans to address the situation; and
 - other relevant information.

Note: Where a system has naturally occurring fluoride concentration greater than the MAC of 1.5 mg/L but not exceeding 2.4 mg/L, the system owner shall notify the consumers of the potential public health issues for the target population as directed by Alberta Health Services.

Appendix 1

Parameters with guidelines for Short Term Exposure, Long Term Exposure*

Parameter	One Day Short Term Exposure Limit (mg/L)	Ten Day Short Term Exposure Limit (mg/L)	Health-based guideline (MAC) (mg/L) (Year of Approval)
Antimony	0.01	0.01	0.006 (1997)
Arsenic	0.06	-	0.01 (2006)
Atrazine + metabolites	-	-	0.005 (1993)
Barium	-	-	1.0 (1990)
Benzene	0.2	0.2	0.005 (1986)
Benzo[a]pyrene	-	-	0.00001 (2005)
Boron	-	-	5.0 (1990)
Bromate	0.2	-	0.01 (1998)
Cadmium	0.04	0.04	0.005 (2005)
Carbon tetrachloride	4	0.2	0.005 (1986)
Chloramines—total	-	-	3.0 (1995)
Chlorpyrifos	-	-	0.09 (1986)
Chromium	1	1	0.05 (1986)
Cyanazine	0.1	0.1	0.01 (2005)
Cyanide	0.2	0.2	0.2 (1991)
Cyanobacterial toxins— Microcystin-LR	0.12	-	0.0015 (2002)
Diazinon	0.02	0.02	0.02 (2005)
Dicamba	-	-	0.12 (2005)

1,4-Dichlorobenzene	-	-	0.005 (1987)
1,2-Dichloroethane	0.7	0.7	0.005 (1987)
Dichloromethane	10	2	0.05 (1987)
2,4-Dichlorophenol	-	-	0.9 (2005)
2,4-Dichlorophenoxyacetic acid (2,4 -D)	1	0.3	0.1 (1991)
Diuron	1	1	0.15 (2005)
Glyphosate	20	20	0.28 (2005)
Lead	0.1	-	0.01 (1992)
Malathion	0.2	0.2	0.19 (2005)
Mercury	0.002	0.002	0.001 (1986)
Methoxychlor	-	-	0.9 (2005)
Metolachlor	2	2	0.05 (1986)
Metribuzin	5	5	0.08 (2005)
Monochlorobenzene	4	4	0.08 (1987)
Nitrate	-	-	45 (1987)
Pentachlorophenol	1	0.3	0.06 (1987)
Picloram	20	20	0.19 (2005)
Selenium	-	-	0.01 (1992)
Simazine	-	-	0.01 (1986)
Terbufos	0.005	0.005	0.001 (2005)
Tetrachloroethylene	2	2	0.03 (1995)
2,3,4,6-Tetrachlorophenol	-	-	0.1 (2005)

Trichloroethylene	-	-	0.005 (2005)
Toluene	20	2	
2,4,6-Trichlorophenol	0.03	0.03	0.005 (2005)
Trifluralin	0.08	0.08	0.045 (2005)
Trihalomethanes-total (THMs)	-	-	0.1 (1993)
Uranium	-	-	0.02 (1999)
Vinyl chloride	3	3	0.002 (1992)

* This table has been adopted from the U.S. Environmental Protection Agency publication '2006 Edition of the Drinking Water, Standards and Health Advisories' EPA 822-R-06-013. the Canadian Drinking Water Quality Guidelines May 2008, and short-term health risk action values for drinking water in Scotland (SHRAVS), Health Protection Scotland, Version 1.3, March 2008.

Note For parameters not listed above, GoA and AHS will review the level to determine the need for action.