National Collaborating Centre for Environmental Health

Centre de collaboration nationale en santé environnementale

Small Drinking Water Systems: Who Does What in Alberta?

1.0 Source Water Protection

1.1 Who has a stewardship role related to water source protection (lead agency)?

Alberta's initiative *Water for Life: Alberta's Strategy for Sustainability*[1,2] is based on a shift to shared governance through partnerships, including *federal*, several *provincial* and *municipal governments*, *watershed groups*, *stakeholders*, and the *public*. This strategy forms the framework for province-wide water management planning.

Municipal drinking water systems are regulated by *Alberta Environment and Sustainable Resource Development (ESRD[3])* under the *Environmental Protection and Enhancement Act (EPEA)*.[4] *ESRD* provides comprehensive and scientifically defensible standards and guidelines that must be applied by the municipalities in the design and operation of waterworks, wastewater, and storm drainage systems.

1.2 Who oversees liquid and solid waste management?

ESRD is responsible for drinking water and wastewater programs for public systems requiring health-related treatment of raw water. *ESRD* provides comprehensive and scientifically defensible standards and guidelines that must be applied by the municipalities in the design and operation of waterworks, wastewater, and storm drainage systems.

System owners/utilities are responsible for meeting the regulatory requirements of *ESRD* and for production and delivery of safe drinking water to consumers; *System owners/utilities* are also responsible for maintaining the water distribution system to the service connection.

1.3 Who is responsible for land use planning activities (from livestock to farming practices, including activities addressing drinking water concerns)?

[1] http://www.waterforlife.alberta.ca/
[2] http://environment.gov.ab.ca/info/library/8035.pdf
[3] http://srd.alberta.ca/
[4] http://environment.alberta.ca/03147.html

Land-use planning is a responsibility shared by the provincial government and local municipalities.[5] It is governed by several pieces of legislation including the *Public Lands Act (PLA)*[6] and *Municipal Government Act (MGA)*.[7]

The Land Use Framework governs regional planning.[8] Regional plans are available at: https://www.landuse.alberta.ca/Pages/default.aspx

Alberta's *Water for Life* action plan[9] is intended to provide guidance in making decisions, by anyone with the authority to do so, for an outcome that is consistent and coordinated. For example, a *Municipal Development Authority* may use the plan to make decisions on land use. Another example is a *Provincial Government Authority* making a decision regarding a point-source discharge. The plan communicates the desires, intentions, and possible consequences of decisions.

1.4 Who is responsible for ensuring that activities, such as construction of highway infrastructure, logging, or mining neither degrade source waters nor introduce contaminants into the water supply?

Under Alberta's *Water for Life* action plan[10] (see 1.1), there is shared governance through partnerships, including *federal*, several *provincial* and *municipal governments*, *watershed groups*, *stakeholders*, and the *public*. Under this plan, several factors taken into consideration when selecting a site for new or expanded water supply and treatment works include:

- isolation from non-compatible land uses;
- facility location with respect to raw water source, area(s) being served, and proximity to associated utilities;
- physical site problems, including susceptibility to flooding, subsurface geology, or proximity to natural watershed areas;
- adequacy of site for future expansion.

1.5 Who delivers permits to draw water?

Under the *Water Act*,[11] Alberta's *Ministry of Environment and Sustainable Resource Development (ESRD)* delivers permits to draw water.

1.6 Who has control over the watershed and delineates the watershed/aquifer area?

Alberta operates under a shared governance model[12] where both government and other stakeholders share responsibility for the development and delivery of policy, planning, and programs or services, but where the government retains legislative accountability. Partnerships include *federal*, several *provincial* and *municipal governments*, *watershed groups*, *stakeholders*, and the *public*. This strategy forms the framework for province-wide water management planning.

1.7 Who is responsible for the watershed/aquifer management plan? (The plan establishes measures to reduce risks. The watershed management plan may also include an incident and emergency response plan, plan for water conservation, and contingency plans for dealing with water scarcity emergencies).

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[5] http://srd.alberta.ca/LandsForests/LandusePlanning/Default.aspx
[6] http://www.canlii.org/en/ab/laws/stat/rsa-2000-c-p-40/latest/
[7] http://www.qp.alberta.ca/documents/Acts/m26.pdf
[8] https://www.landuse.alberta.ca/LandUse%20Documents/Land-use%20Framework%20-%202008-12.pdf
[9] http://environment.gov.ab.ca/info/library/8236.pdf
[10] http://environment.gov.ab.ca/info/library/8236.pdf
[11] http://environment.alberta.ca/02206.html
[12] http://www.albertawatercouncil.ca/Portals/0/pdfs/SG%20Final%20Report%2009-01-28.pdf

A *person responsible* for a waterworks system shall submit returns and reports respecting the construction, operation, or reclamation of the system[13]:

- as required in an approval or applicable code of practice;
- as required by the *Director (ESRD)*, by a notice in writing.

A *person responsible* for a waterworks system shall:

- obtain water samples;
- submit samples for physical microbiological, radiological, or chemical analysis by an approved laboratory in accordance with an approval, the applicable code of practice, or a notice in writing from the *Director (ESRD)*.

Sample requirements include collection, preservation, storage, handling, and analysis and must be conducted in accordance with:

- *Standard Methods for the Examination of Water and Wastewater*, published by the American Public Health Association, the American Waterworks Association, and the Water Environment Federation, as amended or replaced from time to time, or
- *Methods Manual for Chemical Analysis of Water and Wastes*, published by the *Alberta Research Council*, as amended or replaced from time to time, or
- a method authorized in writing by the *Director (ESRD).*

Unless the *Director (ESRD)* specifies otherwise in an approval, the minimum number of water samples to be obtained for analysis of bacteriological quality must be:

- obtained in accordance with the *Guidelines for Canadian Drinking Water Quality*, published by Health Canada, as amended or replaced from time to time;
- evenly distributed through the sampling period.

Where, in the opinion of the *Director*, a sample or analysis is unsatisfactory, the *Director* may require a person responsible for a waterworks system to:

- resubmit the same sample for analysis or reanalyze the same sample;
- take and analyze additional samples; or
- take and analyze samples at a greater frequency.

A *person responsible* for a waterworks system shall comply with:

- the terms of the Potable Water Regulation, Alberta;
- the requirements of the *Director*.

Waterworks owners can prepare for source protection for waterworks utilities by identifying potential partners, issues, and concerns pertinent to their facility and identifying potential solutions.[14] Each utility will share concerns with other neighbouring facilities in the same area and collaborate to share information and efforts.

The perspective of the *waterworks utility* and input into the process needs to be on contaminants that may not be adequately controlled by the treatment system of a waterworks system. A source protection plan must identify the threshold within which the source water is of adequate quality and examine the source for existence, or potential for introduction of, contaminants that are above or outside the acceptable range.[15]

Control measures are not limited to eliminating the practice of the activity within the upstream watershed but may include multiple levels of providing protection that will effectively eliminate the threat and provide satisfactory protection of the finished water quality.

[13] http://www.canlii.org/en/ab/laws/regu/alta-reg-122-1993/latest/alta-reg-122-1993.html
[14] https://awwoa.ab.ca/home/pdfs/Source%20Protection%20Presentation.pdf
[15] https://awwoa.ab.ca/home/pdfs/Source%20Protection%20Presentation.pdf

Some protection measures may include programs for:

- land use / buffer zones;
- agricultural tillage practices;
- stormwater management;
- material disposal and recycling;
- landfills;
- used oil collection;
- pesticide container collection;
- hazardous waste round up;
- private sewage systems siting, construction, and management;
- shoreline and riparian area restoration;
- and many others.

1.8 Any source vulnerability assessment and ranking?

Raw water from a selected source should be of sufficient quality such that it can be economically treated to produce finished water that complies with Alberta's potable water quality (see 3.2) and treatment requirements (see 2.7).[16] Factors that influence the choice of raw water source should include: reliability, treatability, environmental impact, and economics. The choice of filtration process should be based on total coliform count, turbidity, and total organic carbon.

Since level of treatment would be dependent on raw water quality, *owners* may:

- develop watershed protection programs to reduce any potential risk of source pollution;
- maintain a sanitary control area around all sources for the purpose of protecting them from existing and potential sources of contamination;
- develop a watershed control program, identifying land ownership and activities which may adversely affect source water quality;
- develop watershed control measures, including documentation of ownership and relevant written agreements and monitoring of activities and water quality.

2.0 Water Treatment and Distribution

2.1 Any lead funding organization for water system planning and infrastructure improvements?

Funding for regional systems comes from *Water for Life.*[17] Development of new regional water and wastewater systems are supported under the Alberta Municipal Water/Wastewater Partnership.[18] Eligible municipalities may receive funding for capital construction of municipal water supply and treatment, and wastewater treatment and disposal facilities.[19]

2.2 Any construction permits?

Municipalities are responsible for construction permits.

[16] http://environment.gov.ab.ca/info/library/8556.pdf
[17] http://www.transportation.alberta.ca/2778.htm
[18] http://municipalaffairs.alberta.ca/municipalgrants-description.cfm?program_id=29
[19] http://www.municipalaffairs.alberta.ca/msi-qualifying-projects.cfm

Under *ESRD*, *engineering consultants* and/or *system owners/utilities* are responsible for detailed project design and satisfactory construction and operation of waterworks and wastewater systems.[20]

Alberta ESRD classifies all waterworks facilities based on staff recommendations and review by the *Alberta Operator Certification Advisory Committee*.[21] The *system owner* or authorized representative may also request a review of a facility classification. The classification of a water distribution system is based upon the population served by that facility, while the classification of a water treatment facility is based on the degree of difficulty of operating that facility. The facility classification shall be based on the *Water and Wastewater Operators' Certification Guidelines* of *ESRD* as amended or replaced from time to time.

2.3 Any fee collected for water distribution?

Municipalities/waterworks owners set the rates on a case-by-case basis.

2.4 Any operator permit? Any training? How are new policies disseminated?

In a waterworks system, at all times, the operations of the water treatment plant and water distribution system must be performed by, or under the direction of, a person who holds a valid certificate of qualification at the applicable level set out in an approval or applicable code of practice.[22]

A *person responsible* for a waterworks system shall:

- at no time permit the number of certified operators available to operate or direct the operation of the water treatment plant or water distribution system to fall below the applicable number as set out in an approval or applicable code of practice;
- notify the *Director (ESRD)* in writing with the names of all certified operators within 30 days of any change of certified operators.

The *Director (ESRD)* may issue the following kinds of certificate of qualification:

- water treatment operator certificate of qualification;
- water distribution operator certificate of qualification at any level described in the *Water and Wastewater Operators' Certification Guidelines,* published by the *Department (ESRD)*, as amended from time to time.

An applicant for any level of certificate of qualification must:

- apply to the *Director (ESRD)* on a form acceptable to the Director;
- meet the qualification requirements as set out in the guidelines for that level of certificate of qualification;
- be at least 18 years of age.

2.5 Any assessment of treatment system? Any licence of treatment system? By whom?

All analytical data submitted to the *Department (ESRD)* shall be analyzed by *laboratories* accredited to the requirements of ISO/IEC 17025[23] – General requirements for the competence of testing and calibration laboratories, for drinking water tests methods specified by the *Regional Director (ESRD)*.

[20] http://www.environment.gov.ab.ca/info/library/8558.pdf
[21] http://environment.gov.ab.ca/info/library/8555.pdf
[22] http://www.qp.alberta.ca/documents/codes/GROUNDWATER2.PDF
[23] http://www.cala.ca/pr_facil_accred_Nov2004.pdf

The exception to this requirement is the analysis done by *municipalities* in accordance with the Alternate Laboratory Data Quality Assurance Program[24] of *ESRD*.

Accreditation to the *laboratory* shall be granted by an agency that meets the requirements of ISO 17011 – Conformity assessment – General requirements for accreditation bodies accrediting conformity assessment bodies or its predecessor ISO Guide 58, General Criteria for the Operation and Mutual Recognition of Laboratory Accreditation Systems, and is a full member signatory to the International Laboratory Accreditation Cooperation.

Municipalities / system owners / operators shall undertake a risk assessment of the waterworks systems from source to tap to ascertain the integrity, reliability, and long-term sustainability of the system to provide safe drinking water to the consumer. This independent assessment shall be done every five years by a *third party* approved by the *Regional Director (ESRD)*, using the criteria established in Facility Risk Assessment Guidelines or as determined by the *Regional Director*. Based on this assessment, the facility shall be rated from low to high risk in supplying safe drinking water in accordance with the Risk Factor Tables. This report shall be submitted to the *Regional Director (ESRD)* for review and follow-up. An independent assessment of the facility is necessary to assure the *general public* and the *Regional Director (ESRD)* that *municipalities / system owners / operators* are committed to take the required action to reduce any potential risk in providing safe drinking water to the consumer.

2.6 Who is responsible for the maintenance and upgrade of the water treatment?

Alberta Health[25] and *Alberta Health Services*[26] regulate all drinking water systems in Alberta through the *Public Health Act* and the Nuisance and General Sanitation regulation.

The *Environmental Public Health Manual for Safe Drinking Water*[27] details information ranging from drinking water parameters to sampling protocols, and results interpretation to water treatment for **private systems** and those **public systems** not regulated by *Alberta ESRD*.

ESRD[28] provides additional legislation, regulations, standards and guidelines for systems serving the **public** (such as municipal systems) or those **public systems that require health-related treatment** of their drinking water sources.

Alberta Agriculture and Rural Development[29] provides general information and resources for **private** drinking water systems on privately owned farms and acreages:

The *Government of Alberta* provides grants to support the construction of and upgrades to waterworks systems. Alberta's comprehensive review (*Water for Life: Alberta's Strategy for Sustainability)* of all approved waterworks facilities acts as the baseline for future planning to ensure sustainable drinking water systems. The assessment information is updated and maintained annually. *Alberta Transportation* administers the *Alberta Municipal Water/Wastewater Partnership (AMWWP)* funding program for municipally owned waterworks systems on behalf of the province.[30]

[24] http://environment.alberta.ca/01220.html
[25] http://www.health.alberta.ca/
[26] http://www.albertahealthservices.ca/
[27] http://books.google.ca/books/about/Environmental_Public_Health_Manual_for_S.html?id=GNtamwEACAAJ&redir_esc=y
[28] http://environment.alberta.ca/
[29] http://www.agric.gov.ab.ca/app21/rtw/index.jsp
[30] http://www.transportation.alberta.ca/2776.htm

Prior to commencing an extension or replacement of a water distribution system or a modification of potable water storage, the *registration holder* or approval holder shall inform the *Regional Director (ESRD)* in writing of the intent to undertake the extension, replacement, or modification; the information must contain (where applicable)[31]:

- a registration or approval number for the waterworks system as issued under the Act (Environmental Protection and Enhancement);
- the location of the proposed extension, replacement, or modification;
- written confirmation, stamped and signed by a *professional engineer,* that the increased water flow associated with the extension is within the design capacity of the existing water distribution system;
- written confirmation, stamped and signed by a *professional engineer*, that the increased water demand associated with the extension is within the design capacity of the authorized waterworks system providing potable water to the water distribution system;
- any other information required by the *Regional Director (ESRD)*.

On request, the *registration holder* or approval holder shall immediately provide to the *Regional Director (ESRD)* or *inspector* any engineering drawings, specifications, or other information regarding any aspect of the extension of a water distribution system, the replacement of a portion of a water distribution system, or the modification of potable water storage.

The equipment and controls for filtration, disinfection, and all other required treatment in a waterworks system must be operated in a manner that achieves the potable water quality required by the AB *Potable Water Regulation*, an approval or code of practice.

In order to ensure continuous operation at a water treatment plant:

- spare parts, required to maintain the equipment used for disinfection of water or that are critical components of the waterworks system, must be reasonably available; or
- a backup water treatment system must be installed and maintained in operating condition.

2.7 Any requirements for the water supply system?

A waterworks system must be designed, operated, and maintained to achieve under all normal and foreseeable operating conditions all water quality requirements specified in the Alberta Potable Water Regulation (Alta. Reg. 277/2003),[32] an approval or the applicable code of practice.

A waterworks system must be designed so that it meets as a minimum[33]:

- the standards and design requirements set out in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems*, published by the *Department (ESRD)*, as amended or replaced from time to time; or
- any other standards and design requirements specified by the *Regional Director (ESRD)*.

The design of a waterworks system or a portion of a waterworks system must be stamped and signed by the *professional engineer* who designed the system or portion of the system.

The level of potable water treatment is dependent on whether the raw water is obtained from a surface supply, groundwater under the direct influence of surface water (GUDI), or

[31] http://www.canlii.org/en/ab/laws/regu/alta-reg-277-2003/latest/alta-reg-277-2003.html
[32] http://www.qp.alberta.ca/documents/Regs/2003_277.pdf
[33] http://www.canlii.org/en/ab/laws/regu/alta-reg-122-1993/latest/alta-reg-122-1993.html

groundwater. All waterworks systems, with surface water or GUDI source, shall be provided with filtration and disinfection. Filtration and disinfection together shall achieve a minimum of 3-log reduction of *Giardia* and *Cryptosporidium*, and 4-log reduction of viruses. In addition, chlorine residual (free, combined, or total chlorine) of not less than 0.1 mg/L shall be maintained in the water distribution system.

The potable water treatment performance standards consist of four filtration types[34]:

- Rapid Sand Filtration –
  Treated water turbidity levels from individual filters shall be less than or equal to 0.3 NTU at all times. Exceedance of this limit is allowed up to 1 NTU for a cumulative period of 15 minutes per day per filter for discharge into the clear water tank. Treated water turbidity levels from individual filters shall be based on continuous measurements of the turbidity and recorded at no more than five-minute intervals (with online turbidimeter) at a point upstream of the combined filter effluent line or the clear water tank.

  Particle counts (particles greater than 2 µm) from individual filters shall not exceed an absolute value of 50 particles/mL. Exceedance of this limit is allowed up to 200 particles/mL for a cumulative period of 15 minutes per day per filter for discharge into the clear water tank. The particle counts shall be based on continuous measurements of particles and recorded at no more than five-minute intervals (with an online particle counter) at a point upstream of the combined filter effluent line or the clear water tank.

- Slow Sand Filtration –
  Treated water turbidity levels from individual filters shall be less than or equal to 1 NTU at all times. Exceedance of this limit is allowed up to 3 NTU for a cumulative period of three hours per day per filter for discharge into the clear water tank.

  Treated water turbidity levels from individual filters shall be based on continuous measurements of turbidity and recorded at no more than five-minute intervals (with online turbidimeter) at a point upstream of the combined filter effluent line or the clear water tank.

- Membrane Filtration –
  Cysts/oocysts/virus reduction credit for the membrane filtration system shall be based on product specific challenge testing and verified by direct integrity testing of the membrane, as described in the latest edition of the USEPA Membrane Filtration Guidance Manual. An *independent third party*, in accordance with the criteria outlined in this guidance manual, shall perform the challenge tests. The maximum removal credit shall be the lower of the two values established during the challenge test or the maximum log removal value verified by the direct integrity test during the course of normal operation.

  As a minimum standard, the membrane filtration systems shall meet the following turbidity standards, particle reduction standards, and direct integrity test standards:
  - Turbidity Reduction
    Treated water turbidity levels from an individual filter train shall be less than or equal to 0.1 NTU at all times. Exceedance of this limit is allowed up to 0.3 NTU for a cumulative period of 15 minutes per day per filter module for discharge into the clear water tank.

    Treated water turbidity levels from an individual filter train shall be based on continuous measurements of turbidity and recorded at no more than five-

[34] Section 1.3.1 (http://environment.gov.ab.ca/info/library/8555.pdf)

minute intervals (with online turbidimeter) at a point upstream of the combined filter effluent line or the clear water tank.

- Particle Reduction
  Particle counts (particles greater than 2 µm) from an individual filter train shall not exceed an absolute value of 20 particles/mL. Exceedance of this limit is allowed up to 50 particles/mL for a cumulative period of 15 minutes per day per filter train for discharge into the clear water tank. For those membranes that operate under vacuum, where air entrainment may be a problem, exceedance of this limit is allowed up to 200 particles/mL for a cumulative period of 30 minutes per day per filter train.

  The particle counts shall be based on continuous measurements and recorded at no more than five-minute intervals (with an online particle counter) at a point upstream of the combined filter effluent line or the clear water tank.

- Direct Integrity Test
  A direct physical test shall be applied daily to each membrane train to identify and isolate integrity breaches. The direct integrity test shall be applied in a manner such that a 2-µm hole contributes to the response from the test. The direct integrity test shall be capable of verifying the log reduction value awarded to the membrane process.

- Cartridge Filtration –
  Cysts/oocysts reduction credit for cartridge filtration system shall be based on product specific challenge testing, as described in the latest edition of the USEPA's LT2ESWTR Toolbox Guidance Manual. An *independent third party*, in accordance with the criteria outlined in this guidance manual, shall perform the challenge tests.

  As a minimum standard, cartridge filtration systems shall meet the following turbidity standards. In addition to the turbidity requirement, particle reductions standards may also be used, at the discretion of the *system owner*. However, particle counts may be monitored to optimize filtration, either for filter-to-waste times or for monitoring spikes or for low-level optimization down to 0.02 or 0.03 NTU.

  - Turbidity Reduction
    Treated water turbidity levels from the individual filter module shall be less than or equal to 0.3 NTU at all times. Exceedance of this limit is allowed up to 1 NTU for a cumulative period of 15 minutes per day per filter for discharge into the clear water tank.

    Treated water turbidity levels from the individual filter module shall be based on continuous measurements of the turbidity and recorded at no more than five-minute intervals (with an online turbidimeter) at a point upstream of the combined filter effluent line or the clear water tank.

  - Particle Reduction
    Particle counts (particles greater than 2 µm) from the individual filter module shall not exceed an absolute value of 50 particles/mL. Exceedance of this limit is allowed up to 200 particles/mL for a cumulative period of 15 minutes per day per filter for discharge into the clear water tank.

    Particle counts shall be based on continuous measurements and recorded at no more than five-minute intervals (with an online particle counter) at a point upstream of the combined filter effluent line of the clear water tank.

All waterworks systems shall provide disinfection to:

- inactivate the pathogens not removed by clarification and filtration and achieve the level of cysts/oocysts reduction stipulated;
- inactivate viruses in surface water, GUDI, and groundwater systems and achieve the level of virus reduction stipulated;
- maintain total chlorine residual in the water distribution system.

Disinfection methods consist of:

- chlorine (free and combined) – use of the "CT" concept to demonstrate satisfactory treatment, since monitoring for very low levels of pathogens in treated water is analytically very difficult;
- ultraviolet light – based on the "IT" concept that is equivalent to the "CT" concept of a chemical disinfectant dose;
- chlorine dioxide – "CT" concept, same as for chlorine;
- ozone – "CT" concept, same as for chlorine and chlorine dioxide;
- fluoridation – when practised, adequate controls shall be maintained at all times to provide a fluoride ion concentration in treated water to meet the optimum concentration in the latest edition of GCDWQ (0.8 to 1.0 mg/L in current web edition). A monthly average and daily variation shall be within ± 0.1 mg/L and ± 0.2 mg/L respectively.

  The *Regional Director (ESRD),* under certain circumstances, may allow optimum concentration to be lower than 0.8 mg/L.

3.0 Drinking Water Quality and Monitoring

3.1 Who is the lead agency for drinking water quality?

ESRD is responsible for public drinking water systems in Alberta, using the "multi-barrier source to tap approach" to develop the drinking water program and associated waterworks standards and guidelines.

Alberta Health Services (AHS) is responsible for application of the *Public Health Act of Alberta* and the role applies to all drinking water systems, both large and small, and to all aspects of safe drinking water production and delivery, if there is a concern about health impacts or disease transmission.[35]

3.2 Who defines water quality standards?

The objective of *ESRD* is to develop comprehensive and scientifically defensible standards and guidelines that are effective, reliable, achievable, and economically affordable.[36] For provision of safe drinking water, there should be no weak link in the program that may potentially affect the quality of drinking water and increase the risk of someone becoming ill from drinking the water.

The physical, microbiological, chemical, and radiological characteristics of the potable water in a waterworks system must be maintained to meet as a minimum:

- the application Maximum Acceptable Concentration or Interim Maximum Acceptable Concentration specified in the *Guidelines for Canadian Drinking Water Quality* (Health Canada) for the parameters listed in the *Standards and Guidelines for*

[35] http://environment.gov.ab.ca/info/library/8555.pdf
[36] http://www.environment.gov.ab.ca/info/library/8558.pdf

Municipal Waterworks, Wastewater and Storm Drainage Systems (*Alberta ESRD*) as amended or replaced from time to time;
- any additional or other limits established by the *Regional Director (ESRD)* in an approval or a code of practice.

No person shall use or permit the use of a chemical for the treatment of water unless:
- the chemical is listed as a direct or indirect additive in *Standard 60* or *Standard 61*, published by the American National Standards Institute and National Sanitation Foundation (ANSI/NSF);
- the chemical is listed in the approval;
- the person has obtained written authorization of the *Regional Director (ESRD)* for use of the chemical.

3.3 Who is responsible for administering drinking water regulations, if any?

Alberta Health Services Board is responsible for environmental health and monitoring drinking water.[37] Specific questions or concerns regarding drinking water quality are directed to the *Alberta Health Services* or to the *local municipal officials*, who are ultimately responsible for the water they distribute.

3.4 Who enforces regulations, if any?

Alberta Health Services are responsible for application of the *Public Health Act* of Alberta to all drinking water systems (large and small), all aspects of safe drinking water production and delivery, and any concerns about health impacts or disease transmission.

3.5 Who ensures the accountability of government and water suppliers?

Any failure or shut-down of the equipment used for disinfection must be reported immediately to[38]:
- *Regional Director (ESRD)*;
- *Alberta Health Services*.

3.6 Who is responsible for the assessment of public water supply systems? (Identify critical points within the treatment process for effective monitoring, control and management including determining treatment efficiency in the removal or inactivation of harmful agents found in the source water.)

Where fluoride is added to a waterworks system, the application of fluoride, the monitoring of fluoride, the reporting of fluoride, the design of the fluoridation equipment, and the operation of the fluoridation equipment must be in accordance with requirements specified in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage systems* (*AB Department/ESRD*).

Except where permitted by an approval, no person shall use or permit the use of any chemical or any commercial product in circumstances such that the chemical or commercial product may come into contact with water in any part of a waterworks system.

No person shall cause or permit any connection in a waterworks system that allows a substance that may cause an adverse effect to enter into the waterworks system.

[37] http://www.albertahealthservices.ca/services.asp?pid=service&rid=1052212
[38] http://www.canlii.org/en/ab/laws/regu/alta-reg-122-1993/latest/alta-reg-122-1993.html

Systems servicing a population of at least 10,000 shall sample for cysts and oocysts monthly for a period of two years, and increase frequency of monitoring to one a week during spring runoff periods.

Systems serving a population of less than 10,000 shall first monitor for *E.coli* at least every two weeks for a one-year period. For systems that use sources other than lakes or reservoirs, increase the frequency of monitoring to once a week during spring runoff periods. No cysts and oocysts monitoring will be required under the following conditions:

- systems that use lakes or reservoirs as sources and have an average *E.coli* concentration of less than 10/100mL, based on all samples in a one-year period;
- systems that use sources other than lakes and reservoirs and have an average *E.coli* concentration of less than 50/100 mL, based on all samples in a one-year period.

Systems meeting the criteria shall be required to provide filtration and disinfection to achieve a minimum of 3-log reduction of *Giardia* and *Cryptosporidium*, and 4-log reduction of viruses.

Systems serving a population of less than 10,000, triggered into cysts and oocysts monitoring, will sample at least four times per year for a period of two years, or as determined by the *Regional Director (ESRD)* based on site specific conditions.

Cysts and oocysts shall be sampled, analysed, and reported in accordance with the USEPA Method 1623, or as amended.

If treated water turbidity or particle count meets the prescribed limits, the inactivation credit for *Giardia, Cryptosporidium*, and viruses through filtration shall be determined.

For systems not meeting turbidity or particle requirements, *ESRD* may grant a limited or no filtration credit for a limited period until the plant can be optimized or upgraded.

Depending on disinfectant used, the inactivation disinfection credit for *Giardia*, *Cryptosporidium*, and viruses shall be determined.

Depending on the raw water quality, filtration alone may not be adequate to achieve the inactivation required for cysts and oocysts. Other option credits are available to the *system owner* for further inactivation of cysts and oocysts. The intent of this approach is to provide systems with flexibility in selecting a cost effective compliance strategy to achieve the required log reduction.

3.7 Any approval process for newly built water treatment systems?

The *Government of Alberta* provides grants to support the construction of and upgrades to waterworks systems.[39] Alberta's comprehensive review (*Water for Life: Alberta's Strategy for Sustainability)* of all approved waterworks facilities acts as the baseline for future planning to ensure sustainable drinking water systems. The assessment information is updated and maintained annually. *Alberta Transportation* administers the *Alberta Municipal Water/Wastewater Partnership (AMWWP)* funding program for municipally owned waterworks systems on behalf of the province.

The design of a waterworks system or a portion of a waterworks system must be stamped and signed by the *professional engineer* who designed the system or portion of the system.

Municipalities / system owners / operators shall undertake a risk assessment of the waterworks systems from source to tap to ascertain the integrity, reliability, and long-term

[39] http://environment.gov.ab.ca/info/library/8156.pdf

sustainability of the system to provide safe drinking water to the consumer.[40] This independent assessment shall be done every five years by a *third party* approved by the *Regional Director (ESRD)*, using the criteria established in Facility Risk Assessment Guidelines or as determined by the *Regional Director (ESRD)*. Based on this assessment, the facility shall be rated from low to high risk in supplying safe drinking water in accordance with the Risk Factor Tables. This report shall be submitted to the *Regional Director (ESRD)* for review and follow-up. An independent assessment of the facility is necessary to assure the *general public* and the *Regional Director (ESRD)* that *municipalities / system owners / operators* are committed to take the required action to reduce any potential risk in providing safe drinking water to the consumer.

3.8 Who is responsible for monitoring the water system? Any source water monitoring?

All records shall bear the signature of the *operator* responsible for the waterworks system. *Municipalities* shall keep these records available for inspection by the *Regional Director (ESRD)* and send the records to the Regional Director if requested.[41]

Municipalities shall record the following information and maintain the following records for at least five years from the date the record was created:

- Bacteriological analysis results;
- Turbidity analysis results;
- Daily records, including but not limited to:
    - flow meter readings,
    - chlorine concentrations,
    - turbidity analysis results,
    - information on the level of inactivation of *Giardia* cysts, *Cryptosporidium* oocysts, and viruses achieved through disinfection:
        - temperature at each residual concentration sampling point,
        - pH if using chlorine,
        - peak flow,
        - filled capacity/depth of the clear water tank,
        - disinfectant contact time T, and corresponding concentration C, and
        - inactivation ratio,
    - treatment chemical dosages,
    - iron and manganese concentrations,
    - all fluoridation information,
    - all electronic and monthly reports submitted to *Alberta ESRD,*
    - records of action taken by the *municipality* to correct contraventions of potable water quality limits (MAC or IMAC), including the following information for each contravention:
        - name and address of the person who discovered the contravention,
        - copies of all notifications to the *public*.

The *municipality* shall maintain the following records for the life of the waterworks system:

- the system operations program;
- copies of all:
    - applications submitted to *ESRD* for the approval or registration regarding the waterworks system and correspondence related to the approval or registration,
    - drawings and specifications by the *engineer,*
    - project reports,
    - construction documents,
    - record drawings,

[40] http://environment.alberta.ca/01249.html
[41] http://environment.gov.ab.ca/info/library/8555.pdf

    - all reports of inspections conducted by *ESRD*,
    - all correspondence sent to *ESRD* regarding a proposed extension of a water distribution system, replacement of a portion of a water distribution system, expansion or modification of potable water storage within the water distribution system,
    - all approvals or registrations issued under the Act for the waterworks system,
    - all annual reports,
    - all reports prepared;
- all physical, organic, and inorganic chemical and pesticide analytical results required pursuant to any Approval or Code of Practice, excluding daily monitoring.

The *owner* shall compile monthly reports to include, at a minimum:

- name and telephone number of all *operators* in direct charge;
- analytical results for all parameters required to be monitored in accordance with an Approval or a Code of Practice during the month;
- locations of all sampling performed during the month in accordance with an Approval or a Code of Practice;
- name and manufacturer of all treatment chemicals added during the month and each manufacturer as listed in the *Standard 60*, published by the American National Standards Institute and the National Sanitation Foundation (ANSI/NSF), as amended or replaced from time to time;
- results of all required measurements conducted during the month in accordance with an Approval or a Code of Practice.

In addition to any other reporting required under the Act, the regulations, an Approval or a Code of Practice, the *owner* shall submit to the *Regional Director (ESRD)* an annual report, by February 28 of the year following the calendar year in which the information on which the report is based was collected. The annual report shall contain, at a minimum, all of the following information:

- a summary of the monthly reports, specifying the monthly minimum, average, and maximum results for each parameter monitored;
- results of any other compliance monitoring done during the year pursuant to an Approval or Code of Practice, that was not included in any monthly report;
- a description of any problems experienced and corrective actions taken at the waterworks system during the year with respect to environmental matters.

3.9 In case of adverse quality standards, who notifies whom (government, public, water supplier)?

The *owner* shall immediately report to the *Regional Director (ESRD)* any contravention of the Approval or the Code, either:

- by telephone, or
- by a method, in compliance with the release reporting provisions in the Act and the regulations, or authorized in writing by the Regional Director (ESRD).

The *owner* shall immediately report to the *Regional Director (ESRD)* any structural or equipment malfunction in the waterworks system that may affect the quality or supply of potable water.

In addition to the immediate report, the *municipality* shall provide a report to the *Regional Director (ESRD)*

- in writing; or
- by a method in compliance with the release reporting provisions in the Act and the regulations, or authorized in writing by the *Regional Director* within seven

calendar days after the discovery of the contravention, or within another time period specified in writing by the Regional Director, unless the requirement for the report is waived by the Regional Director.

The required report shall contain, at a minimum, the following information:

- description of the contravention;
- date of the contravention;
- duration of the contravention;
- legal land description of the location of the contravention;
- explanation as to why the contravention occurred;
- summary of all preventive measures and actions that were taken prior to the contravention;
- summary of all measures and actions that were taken to mitigate any effects of the contravention;
- summary of all measures that will be taken to address any remaining effects and potential effects related to the contravention;
- number of the Approval or registration issued under the Act for the waterworks system, and name of the person who held the Approval or registration at the time the contravention occurred;
- name, address, work phone number, and responsibilities of all persons operating the waterworks system at the time the contravention occurred;
- name, address, work phone number, and responsibilities of all persons who had charge, management, or control of the waterworks system at the time the contravention occurred;
- summary of proposed measures that will prevent future contraventions, including a schedule of implementation for these measures;
- any information that was maintained or recorded under an Approval or a Code of Practice, as a result of the incident;
- any other information required by the *Regional Director* in writing.

4.0 Waste Management (part of source water protection as well)

ESRD is responsible for Drinking Water and Wastewater Programs for public systems in Alberta.

In accordance with the *Potable Water Regulation (277/2003)*[42] and the *Wastewater and Storm Drainage Regulation*[43] and *Wastewater and Storm Drainage (Ministerial) Regulation (119/93 and 120/93)*,[44] a waterworks system, a wastewater system, and a storm drainage system shall be designed so that they meet, as a minimum, the performance standards and design requirements set out in the *Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems*,[45] published by *ESRD*, or any other standard and design requirements specified by the *Regional Director (ESRD)*.

The wastewater system should produce effluent to meet required limits at all times. Consideration should be given to optimize operation of the system to handle both dry weather and wet weather flows.

[42] http://www.qp.alberta.ca/documents/Regs/2003_277.pdf
[43] http://www.qp.alberta.ca/documents/Regs/1993_119.pdf
[44] http://www.qp.alberta.ca/documents/Regs/1993_120.pdf
[45] http://environment.alberta.ca/01249.html

The *owner* should ensure the system is operated, maintained, and has appropriate backup facilities to protect against failures of the power supply, treatment process, equipment, or structure.

The wastewater system should be managed and operated in accordance with the *EPEA* approval of the systems. Non-domestic discharge should not interfere with the operation of the treatment plant nor should it impact on the treatability of wastewater and affect plant performance.

The *owner* should ensure the development and implementation of an emergency response plan as part of the operations program—emergencies such as pipeline breakage or accidental spills of any toxins to sewers and/or treatment plants. The plan should include:

- general procedures for routine or major emergencies within the wastewater system;
- a contingency plan for facilities becoming inoperable in a major emergency.

The plant should be operated within its design capacity and the *owner* should take preventative or corrective action as directed by *ESRD* when results of an inspection conducted by *ESRD* or monthly returns indicate conditions that are currently, or may become, detrimental to system operations.

In accordance with *EPEA*, day-to-day operations of wastewater systems should be supervised by one or more persons who hold a valid certificate of qualification for the type of class of facility concerned. Approval for each facility will state the required number of certified operators and their required level of certification. Exempted from these requirements are:

- privately owned developments, as defined in the regulations;
- any other systems as determined by *ESRD*.

It is the responsibility of *certified operators* to know and understand the terms and conditions in the operating approval for their facility. It is necessary that the chief operator ensure current certification for operators and that each facility has a contingency plan so certified operator requirements are met in cases of planned absences, unplanned absences, or staff changes.

It is the legal responsibility of the *owner* of each facility to ensure the approval requirements are met, and it is important that an internal program is developed so substitute or replacement personnel are available when necessary.

5.0 Surveillance

5.1 Any process in place to respond to health complaints?

Alberta Health Services Board is responsible for environmental health and monitoring drinking water. Specific questions or concerns regarding drinking water quality are directed to the *Alberta Health Services* or to the *local municipal officials*, who are ultimately responsible for the water they distribute.

Alberta Health Services are responsible for application of the *Public Health Act of Alberta* to all drinking water systems (large and small), all aspects of safe drinking water production and delivery, and any concerns about health impacts or disease transmission.

5.2 Any outbreak surveillance system in place?

There is an *active* and a *passive* system in place. The *active* system is the responsibility of *Medical Health Officers* and serves as an early warning system to detect significant data and respond accordingly. The *passive* system analyzes data for any increase in cases and timing of occurrences. *Public health inspectors* investigate outbreaks and may reopen previous cases.

5.3 Any system in place to link outbreaks to source or system characteristics?

Computerized data is analyzed to identify cases, baselines, trends occurring, etc., and *Public health inspectors* are responsible for tracing the source of the outbreak.

5.4 Who is responsible for managing outbreaks?

The *Alberta Health Department* is responsible for environmental health and enteric outbreaks.

6.0 What is the Role of the Community in the Provision of Safe Drinking Water?

The community approaches *local physicians* regarding health concerns. For water quality, *ESRD*, *Alberta Health*, and *Utilities* work together as regulators.

References/Notes

Environmental Protection and Enhancement Act, RSA 2000, c E-12

- Potable Water Regulation, Alta. Reg. 277/2003

Water Act, RSA 2000, c W-3

Alberta Environment's Drinking Water Program: A Source to Tap, Multi-barrier Approach (MOE Drinking Water Wastewater Policy Section, May 2009), available at: http://environment.alberta.ca/01222.html. This document gives a summary of the program from *ESRD* and refers to other agencies involved and the guidelines they use.

Water for Life: Alberta's Strategy for Sustainability

Standards and Guidelines for Municipal Waterworks, *Wastewater and Storm Drainage Systems*, Drinking Water Branch, Environmental Policy Branch, Environmental Assurance Division, January 2006

For an overview of drinking water for systems under the jurisdiction of *ESRD* with lists of all legislation, regulations, and guidelines, see: http://environment.alberta.ca/01220.html

Notes:

- Of the consumptive uses of water in Alberta, 97.5 per cent comes from surface water and 2.5 percent comes from groundwater.

- Alberta's drinking water systems are either private or public: private systems serve a single privately owned residence or building or public systems that do not require treatment; public systems provide potable water to serve the general public. These

public systems are subject to legislation from either *Alberta Health* or *Alberta Environment*.

Public waterworks systems that require health-related treatment of their raw water before distribution are examples of "*approved*" waterworks systems (under *EPEA* systems). They represent approximately 10 per cent of all systems across the province, but serve approximately 80 per cent of the population.

Public drinking water systems that do not require health-related treatment of their raw water are examples of "*unapproved*" waterworks systems (regulated by *Alberta Health* and *Alberta Health Services*) and represent approximately 90 per cent of all systems across the province; however, they only serve approximately 20 per cent of the population.

- "Waterworks system" means any system providing potable water to a city, town, specialized municipality, village, summer village, hamlet, or settlement area as defined in the *Metis Settlements Act*, municipal development, industrial development, privately owned development or private utility, and includes any or all of the following components:
    - water wells connected to water supply lines, surface water intakes, or infiltration galleries that constitute the water supply;
    - water supply lines;
    - on-stream and off-stream water storage facilities;
    - water pumphouses;
    - water treatment plants;
    - potable water transmission mains;
    - potable water storage facilities;
    - potable water pumping facilities;
    - water distribution systems;
    - watering points (system that provides potable water in bulk to the public).

Activities Designation Regulation, Alta Reg 276/2003

Note that while the National Collaborating Centre for Environmental Health has used its best efforts to ensure the accuracy and reliability of this information, it is provided as a general reference only. Please contact federal, provincial, municipal, and other agencies noted to verify the information provided.

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