

**REQUEST FOR PROPOSAL (RFP):
01R11-21-C016**

FOR THE PROVISION OF

**AAFC Guidelines and Standards and Potable Water
Management Plan Update**

FOR

Agriculture and Agri-Food Canada (AAFC)

Contracting Authority:

Natalie O'Neill, Senior Contracting Officer
Agriculture and Agri-Food Canada
Western Service Centre
300 – 2010 12th Avenue
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TABLE OF CONTENTS

GENERAL INFORMATION

- 1.0 Project Summary
- 2.0 Security Requirements
- 3.0 Interpretation

PART 1: BIDDER INSTRUCTIONS, INFORMATION AND CONDITIONS

- 1.0 Contractual Capacity
- 2.0 Acceptance of Terms and Conditions
- 3.0 Incurring Cost
- 4.0 Enquiries - Solicitation Stage
- 5.0 Rights of Canada
- 6.0 Substantiation of Professional Services Rates
- 7.0 Mandatory Clauses
- 8.0 Debriefing
- 9.0 Office of the Procurement Ombudsman

PART 2: PROPOSAL PREPARATION INSTRUCTIONS & EVALUATION PROCEDURES

- 1.0 Applicable Laws
- 2.0 Submission of Proposal
- 3.0 Proposal Preparation Instructions
- 4.0 Preparation of Technical Proposal (Section 1)
- 5.0 Preparation of Financial Proposal (Section 2)
- 6.0 Certification Requirements (Section 3)
- 7.0 Evaluation Procedures
- 8.0 Request for Proposal Amendment(s)

PART 3: RESULTING CONTRACT TERMS AND CONDITIONS

- 1.0 General Conditions
- 2.0 Requirement
- 3.0 Security Requirements
- 4.0 Contract Period
- 5.0 Contracting Authority
- 6.0 Project Authority
- 7.0 Contractor Representative
- 8.0 Priority of Documents
- 9.0 Basis for Canada's Ownership of Intellectual Property
- 10.0 Replacement of Personnel
- 11.0 Access to Government Facilities/Equipment
- 12.0 Damage to or Loss of Crown Property
- 13.0 Basis of Payment
- 14.0 Method of Payment

- 15.0 Direct Deposit
- 16.0 Invoicing Instructions
- 17.0 Mandatory Certifications
- 18.0 Non-Permanent Resident
- 19.0 Insurance Requirements

LIST OF APPENDICES

- Appendix A - General Conditions
- Appendix B - Statement of Work
- Appendix C - Basis of Payment
- Appendix D - Evaluation Procedures & Criteria
- Appendix E - Certification Requirements

GENERAL INFORMATION

1.0 PROJECT SUMMARY

Agriculture and Agri-Food Canada (AAFC) requires a consulting firm to review and update the Agriculture and Agri-Food Canada Guidelines and Standards for Potable Water Quality Management, and to create a template(s) for site specific Potable Water Quality Management Plans (full and simplified versions, Phase I).

Optional work to populate templates and develop site specific Potable Water Quality Management Plans may be exercised (Phase II).

2.0 SECURITY REQUIREMENTS

There is no security requirement associated with the work.

3.0 INTERPRETATION

In the Request for proposal "RFP",

- 3.1 **"Canada", "Crown", "Her Majesty", "the Government" or "Agriculture and Agri-Food Canada" or "AAFC"** means Her Majesty the Queen in right of Canada, as represented by the Minister of Agriculture and Agri-Food;
- 3.2 **"Contract" or "Resulting Contract"** means the written agreement between Agriculture and Agri-Food Canada and a contractor, comprising the General Conditions (set out in Appendix A of this RFP) and any supplemental general conditions specified in this RFP and every other document specified or referred to in any of them as forming part of the Contract, all as amended by agreement of the Parties from time to time;
- 3.3 **"Contracting Authority" or "authorized representative"** means the AAFC official, identified in Part 3, Article 5.0 of this RFP, responsible for the management of the Contract. Any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor is not to perform Work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from any government personnel other than the aforementioned AAFC official;
- 3.4 **"Contractor"**, means the person or entity whose name appears on the signature page of the Contract and who is to supply goods or services to Canada under the Contract;
- 3.5 **"Minister"** means the Minister of Agriculture and Agri-Food or anyone authorized to act on his/her behalf;

- 3.6 **"Project Authority"** or **"authorized representative"** means the AAFC official, identified in Part 3, Article 6.0 of this RFP, responsible for all matters concerning a) the technical content of the Work under the Contract; b) any proposed changes to the scope of the Work, but any resulting change can only be confirmed by a Contract amendment issued by the Contracting Authority; c) inspection and acceptance of all Work performed as detailed in the Statement of Work, and; review and inspection of all invoices submitted;
- 3.7 **"Proposal"** means an offer, submitted in response to a request from a Contracting Authority, that constitutes a solution to the problem, requirement or objective in the request;
- 3.8 **"Bidder"** means a person or entity submitting a Proposal in response to this RFP;
- 3.9 **"Work"** means the whole of the activities, services, materials, equipment, software, matters and things required to be done, delivered or performed by the Contractor in accordance with the terms of this RFP.

PART 1: BIDDER INSTRUCTIONS, INFORMATION AND CONDITIONS

1.0 CONTRACTUAL CAPACITY

- 1.1 The Bidder must have the legal capacity to enter into legally binding contracts. If the Bidder is a sole proprietorship, a partnership or a corporate body, the Bidder should provide a statement indicating the laws under which it is registered or incorporated together with the registered or corporate name and place of business and the country where the controlling interest/ownership of the organization is located as per Appendix E of this RFP.

2.0 ACCEPTANCE OF TERMS AND CONDITIONS

- 2.1 Agriculture and Agri-Food Canada will only consider Proposals which accept Agriculture and Agri-Food Canada's terms and conditions.
- 2.2 The General Conditions attached in Appendix A and those set out in Part 3 of this RFP shall form part of any Resulting Contract.

3.0 INCURRING COST

- 3.1 The cost to prepare the Proposal will not be reimbursed by Agriculture and Agri-Food Canada.
- 3.2 No cost incurred before receipt of a signed Contract or specified written authorization from the Contracting Authority can be charged to any Resulting Contract.

4.0 ENQUIRIES - SOLICITATION STAGE

- 4.1 All enquiries or issues concerning this solicitation must be submitted in writing. It is the responsibility of the Bidder to obtain clarification of the requirements contained herein, if necessary prior to submitting a proposal.
- 4.2 Enquiries and issues must be received in writing to Natalie O'Neill, the Contracting Authority, **no later than Thursday, August 6, 2020 at 12:00 p.m., CST** to allow sufficient time to provide a response. Enquiries or issues received after this time and date may not be answered prior to the solicitation closing date.

For enquires or issues only, email:

natalie.oneill@canada.ca AND

aafc.wscprocurement-csoapprovisionnement.aac@canada.ca

- 4.3 To ensure consistency and quality of information provided to Bidders, the Contracting Authority will provide, simultaneously to all Bidders any information with respect to **significant** enquiries received and the replies to such enquiries without revealing the sources of the enquiries.

- 4.4 All enquiries and other communications with government officials throughout the solicitation period are to be directed ONLY to the Contracting Authority named below. Noncompliance with this condition during the proposal solicitation period may (for that reason alone) result in disqualification of a Proposal.
- 4.5 Meetings will not be held with individual bidders prior to the closing date/time of this RFP, unless otherwise specified.
- 4.6 Bidders shall not place any conditions or make any assumptions that attempt to limit or otherwise modify the Scope of Work pursuant to the Statement of Work (Appendix B).

5.0 RIGHTS OF CANADA

- 5.1 Canada reserves the right to:
1. Accept any Proposal in whole or in part, without prior negotiation;
 2. Reject any or all Proposals received in response to this RFP;
 3. Cancel and/or re-issue this RFP at any time;
 4. Ask the Bidder to substantiate any claim made in the Proposal;
 5. Enter into negotiations with one or more Bidders on any or all aspects of their Proposals;
 6. Award one or more Contracts;
 7. Retain all Proposals submitted in response to this RFP.

6.0 SUBSTANTIATION OF PROFESSIONAL SERVICES RATES

- 6.1 In Canada's experience, bidders will from time to time propose prices at the time of bidding that they later refuse to honour, on the basis that these prices do not allow them to recover their own costs and/or make a profit. When evaluating the prices for professional services bid, Canada may, but will have no obligation to, require price support for any prices proposed. Examples of price support that Canada would consider satisfactory include:
1. documentation (such as billing records) that shows that the Bidder has recently provided and invoiced another customer (with whom the Bidder deals at arm's length) for services similar to the services that would be provided under a resulting contract, and the fees charged are equal to or less than the price offered to Canada (to protect the privacy of the customer, the Bidder may black out the customer's name and personal information on the invoice submitted to Canada);
 2. a signed contract between the Bidder and an individual qualified (based on the qualifications described in this bid solicitation) to provide services under a resulting contract where the amount payable under that contract by the Bidder to the resource is equal to or less than the price bid;

3. a signed contract with a subcontractor who will perform the work under any resulting contract, which provides that the required services will be provided at a price that is equal to or less than the price bid; or
4. details regarding the salary paid to and benefits provided to the individuals employed by the Bidder to provide services, where the amount of compensation, when converted to a per diem or hourly rate (as applicable), is equal to or less than the rate bid for that resource category.

Once Canada requests substantiation of the prices bid, it is the sole responsibility of the Bidder to submit information (either the information described in the examples above, or other information that demonstrates that it will be able to recover its own costs based on the prices it has proposed) that will allow Canada to determine whether it can rely, with confidence, on the Bidder's ability to provide the required services at the prices bid, while, at a minimum, recovering its own costs. Where Canada determines that the information provided by the Bidder does not demonstrate the Bidder's ability to recover its own costs in providing the prices bid, Canada may, at their sole discretion declare the bid non-compliant.

7.0 MANDATORY CLAUSES

- 7.1 Where the words "**must**", "**shall**" or "**will**" appear in this RFP, the clause is to be considered as a mandatory requirement.

8.0 DEBRIEFING

- 8.1 After contract award, bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within the timeframe specified in the contract award notice. The debriefing may be in writing, by telephone or in person at the discretion of the Contracting Authority.

9.0 OFFICE OF THE PROCUREMENT OMBUDSMAN

If you have issues or concerns regarding the solicitation, you have the option of raising them with the department or with the Office of the Procurement Ombudsman (OPO). The Office of the Procurement Ombudsman was established by the Government of Canada to provide an independent avenue for suppliers to raise complaints regarding the award of contracts under \$25,000 for goods and under \$100,000 for services. You have the option of raising issues or concerns regarding the solicitation, or the award resulting from it, with the OPO by contacting them by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa.opo.gc.ca. You can also obtain more information on the OPO services available to you at their website at www.opo-boa.gc.ca.

PART 2: PROPOSAL PREPARATION INSTRUCTIONS & EVALUATION PROCEDURES

1.0 APPLICABLE LAWS

- 1.1 The Contract shall be interpreted and governed, and the relations between the parties, determined by the laws in force in the Province of Saskatchewan.
- 1.2 In their bid submission, bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their proposal, by deleting the Canadian province specified in the previous paragraph and inserting the Canadian province or territory of their choice. If no change is made, the bidder acknowledges the applicable law specified is acceptable to the Bidder.

2.0 SUBMISSION OF PROPOSAL

- 2.1 Electronic Mail Submissions **MUST** be delivered to and received by the Contracting Authority **no later than 2:00 p.m. CST (local Regina time) Thursday, August 20, 2020.** Please Email your submissions to:

Natalie O'Neill, Senior Contracting Officer
Agriculture and Agri-Food Canada
Western Service Centre
300 – 2010 12th Avenue
Regina, Sask. S4P 0M3
E-mail address: natalie.oneill@canada.ca AND
aafc.wscprocurement-csoapprovisionnement.aac@canada.ca

- 2.2 Electronic mail submissions will be accepted. The maximum email file size that AAFC is capable of receiving is 15 megabytes. The Bidder is responsible for any failure attributable to the transmission or receipt of the emailed bid due to file size. Emails with links to bid documents will not be accepted.
- 2.4 The onus for submitting proposals on time at the specified location rests with the Bidder. It is the Bidder's responsibility to ensure correct delivery of their proposal to the Contracting Authority.
- 2.5 Proposals submitted in response to this RFP will not be returned.

3.0 PROPOSAL PREPARATION INSTRUCTIONS

- 3.1 The proposal **should** be structured in **THREE SEPARATE DOCUMENTS** as indicated below:

Section 1	Technical Proposal (with no reference to price)
Section 2	Financial Proposal
Section 3	Certifications

3.2 The Bidder may **submit a proposal in either official language.**

3.3 Each copy of the proposal is to include the Bidder's legal entity name, the name of the Bidder's contact, address, telephone number, facsimile number, email address and the RFP Number.

4.0 PREPARATION OF TECHNICAL PROPOSAL (SECTION 1)

4.1 In the Technical Proposal, the Bidder should demonstrate its understanding of the requirements of the **Statement of Work Appendix "B"**, as well as demonstrate how the Bidder will meet the requirements of the **Evaluation Procedures and Criteria Appendix "D"**.

5.0 PREPARATION OF FINANCIAL PROPOSAL (SECTION 2)

In the Financial Proposal, the Bidder shall provide a **firm, all-inclusive price** to complete the services, in accordance with the Statement of Work **Appendix B**.

The requirements of the Financial Proposal are detailed in Appendix D, Evaluations Procedures and Criteria.

Prices shall not appear in any area of the proposal except in the Financial Proposal.

6.0 CERTIFICATION REQUIREMENTS (SECTION 3)

In order to be awarded a contract, the certifications attached **in Appendix "E"** will be required. The certifications should be submitted with the proposal. Canada may declare a bid non-responsive if the certifications are not submitted or completed as required. Where Canada intends to reject a proposal pursuant to this paragraph, the Contracting Authority will so inform the Bidder and provide the Bidder with a time frame within which to meet the requirement. Failure to comply with the request of the Contracting Authority and meet the requirement within that time frame period will render the proposal non-responsive.

Compliance with the certifications the Bidder provides to Canada is subject to verification by Canada. The Contracting Authority shall have the right to ask for additional information to verify that the Bidder is compliant with the applicable certifications before and after award of a contract. Any certification made by the

Bidder that is determined to be untrue, whether made knowingly or unknowingly, or any failure to comply with the certifications or comply with the request of the Contracting Authority for additional information, will render the bid non-responsive.

7.0 EVALUATION PROCEDURES

- 7.1 Proposals will be evaluated in accordance with the Evaluation Procedures and Criteria specified in **Appendix D**. Proposals received will be compared separately against the evaluation criteria identified therein for the total requirement described in this RFP and in conjunction with the accompanying **Statement of Work (Appendix B)**.
- 7.2 An evaluation team composed of representatives of the Department of Agriculture and Agri-Food Canada will evaluate the Proposals on behalf of Canada.
- 7.3 The evaluation team reserves the right, but is not obligated, to perform any of the following tasks:
- a) seek clarification or verification from bidders regarding any or all information provided by them with respect to the bid solicitation;
 - b) contact any or all references supplied by bidders to verify and validate any information submitted by them;
 - c) request, before award of any contract, specific information with respect to bidders' legal status;
 - d) verify any information provided by bidders through independent research, use of any government resources or by contacting third parties;
 - e) interview, at the sole costs of bidders, any bidder and/or any or all of the resources proposed by bidders to fulfill the requirement of the bid solicitation.

8.0 REQUESTS FOR PROPOSAL AMENDMENT(S)

- 8.1 Any modifications to this RFP will be made through an amendment which will be posted on the Government Electronic Tendering System (GETS) Buy and Sell.

PART 3: RESULTING CONTRACT TERMS AND CONDITIONS

Upon a Contract being awarded pursuant to RFP # 01R11-21-C016, the following Terms and Conditions shall form part of the Resulting Contract:

1.0 GENERAL CONDITIONS

1.1 The General Conditions attached in **Appendix A** shall form part of any Resulting Contract.

2.0 REQUIREMENT

2.1 The contractor will provide the services identified in **Appendix B, Statement of Work**.

2.2 The Contractor shall maintain, for the duration of the Contract, a designated single point of contact, hereafter referred to as a Contractor Representative, dedicated to managing the Contract.

3.0 SECURITY REQUIREMENT

There is no security requirement associated with the work.

4.0 CONTRACT PERIOD

4.1 The Contract shall be from **Date of Contract Award** and conclude on or before **March 20, 2021**.

5.0 CONTRACTING AUTHORITY

5.1 The Contracting Authority is:

Natalie O'Neill, Senior Contracting Officer
Agriculture and Agri-Food Canada
Western Service Centre
300 – 2010 12th Avenue
Regina, SK S4P 0M3
Telephone: (306) 523-6561
Email address: natalie.oneill@canada.ca

5.2 The Contracting Authority (or authorized representative) is responsible for the management of the Contract. Any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor is not to perform Work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from any government personnel other than the aforementioned officer.

6.0 PROJECT AUTHORITY

6.1 The Project Authority for the Contract is:

To be provided at Contract Award

6.2 The Project Authority, or authorized representative, is responsible for:

1. All matters concerning the technical content of the Work under the Contract;
2. Defining any proposed changes to the scope of the Work, but any resulting change can only be confirmed by a Contract amendment issued by the Contracting Authority;
3. Inspection and acceptance of all Work performed as detailed in the Statement of Work and;
4. Review and approve all invoices submitted.

7.0 CONTRACTOR REPRESENTATIVE

7.1 The Contractor Representative for the Contract is:

To be provided at Contract Award

7.2 The duties and responsibilities of the Contractor Representative shall include the following:

1. Responsible for the overall management of the Contract;
2. Ensure that the Contract is administered in accordance with the terms and conditions of the Contract;
3. Act as a single point of contact to resolve any contractual disputes that may arise. The Contract Representative must have direct access to the level of management within the Contractor's organization vested with the decision-making authority for contractual matters;
4. Shall be established as the only recognized individual from the Contractor's organization to speak on behalf of the Contractor for purposes of Contract management;
5. Monitor all resources that are providing services/deliverables in accordance with the Contract;
6. Liaise with the Project Authority on all matters concerning technical aspects of the Work and performance of its resources; and
7. Manage the transition of any potential resource(s) turnover during the period of the Work.

8.0 PRIORITY OF DOCUMENTS

8.1 The documents specified below form part of and are incorporated into the Contract. If there is a discrepancy between the wordings of any documents which appear on the list, the wording of the document which first appears on the list shall prevail over the wording of any document which subsequently appears on the list:

1. These Terms and Conditions;
2. The Statement of Work, Appendix B hereof;
3. The General Conditions, Appendix A hereof;
4. Basis of Payment, Appendix C hereof;
5. Certification Requirements, Appendix E
6. Request for Proposal # 01R11-21-C016;
7. Contractor's Proposal dated *(to be inserted at contract award)*.

9.0 BASIS FOR CANADA'S OWNERSHIP OF INTELLECTUAL PROPERTY

In this section of the RFP,

9.1 "**Material**" means anything that is created or developed by the Contractor as part of the Work under the Contract, and in which copyright subsists, but does not include computer programs and related software documentation.

9.2 Agriculture and Agri-Food Canada has determined that any intellectual property arising from the performance of the Work under the Contract will vest in Canada, on the following grounds:

Pursuant to the Treasury Board Policy on Title to Intellectual Property Arising under Crown Procurement Contracts, Canada has opted to own the intellectual property rights in any Material subject to copyright that is created or developed as part of the Work, with the exception of computer software or any documentation pertaining to such software.

10.0 REPLACEMENT OF PERSONNEL

10.1. The Contractor will provide the services of the personnel named in the Contractor's Proposal to perform the Work, unless the Contractor is unable to do so for reasons which are beyond its control.

10.2 Should the Contractor at any time be unable to provide their services, the Contractor will contact the Project Authority immediately. In such case, the Contractor is responsible to provide replacement Contractor or personnel who shall be of similar skills and experience as stated in **Appendix D, Evaluation Procedures and Criteria**.

- 10.3 The Contractor shall propose replacement personnel for the Project Authorities review within 5 working days (resume and references). The Contractor shall submit, in writing, to the Project Authority the reasons for the removal of personnel from the Work; the name of the proposed replacement person(s); and the qualifications and experience of the proposed replacement person(s). The Project Authority reserves the right to interview any personnel proposed to be assigned to the Work.
- 10.4 Personnel assigned pursuant to the requirements will be capable of performing the Work at a reasonable level of competence. Should any assigned personnel be deemed unsuitable by the Project Authority the Contractor shall provide an immediate replacement of suitable ability that is acceptable to the Project Authority.
- 10.5 The Contractor shall supply competent back-up personnel so that in the event of unforeseen sickness, accident, or any cause which renders a specific individual unavailable, such individuals can be replaced within five (5) working days by a person of like abilities and qualifications.
- 10.6 The resources assigned for the Contract will be measured regularly for quality of services rendered. The measurement will be based on the quality and timeliness of the deliverables specified in the Statement of Work. In the event that quality and deliverables are not produced as and when requested, in any given month, the Crown has the right to request that the Contractor replace the assigned resources immediately, in accordance with Contract clauses included in or referenced in the RFP # 01R11-21-C016.
- 10.7 In no event shall the Contractor allow performance of the Work by unauthorized and/or unqualified personnel, whether initially named resources or replacement personnel. In addition, acceptance of any replacements by the Project Authority shall not relieve the Contractor from responsibility for failure to meet the requirements of the Contract.

11.0 ACCESS TO GOVERNMENT FACILITIES/EQUIPMENT

- 11.1 Access to the following Canada facilities, equipment, documentation and personnel may be required during the Contract period in order to perform the Work:
- (a) Documentation;
 - (b) Personnel for consultation.
- 11.2 Subject to the approval of the Project Authority, arrangements will be made for the Contractor to access the required facilities, equipment, documentation and personnel at the client's convenience.

11.3 There will be, however, no day-to-day supervision of the Contractor's activities or control of hours of work by the Project Authority.

12.0 DAMAGE TO OR LOSS OF CROWN PROPERTY

12.1 The Contractor shall reimburse Canada any cost or expenses due to the damage to or loss of Crown-owned property resulting from the Contract or the carrying out thereof, or shall, upon reasonable notice, promptly repair such damage or substitute such loss to Canada's satisfaction.

13.0 BASIS OF PAYMENT

13.1 For the services provided, Agriculture and Agri-Food Canada will pay the Contractor in accordance with the Basis of Payment below, and the attached Appendix C (Basis of Payment) for Work performed pursuant to the Contract.

Firm Price:

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a Firm Price of \$ _____ *(to be inserted at contract award)*. Customs duties are included and the Applicable Taxes are extra.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

14.0 METHOD OF PAYMENT

14.1 Payment will be made **in accordance with the following payment schedule**, following the submission of all invoicing documentation as specified in Article 16.0, in accordance with the terms herein this agreement and acceptance by the Departmental Representative.

Milestone No.	Deliverable	Firm Amount <i>(to be inserted at contract award)</i>
1	Phase 1 – Draft Report	
2	Phase 1 – Final Report	
Optional Work		
3	Phase 2 – Draft Report	
4	Phase 2 – Final Report	

15.0 DIRECT DEPOSIT

The Contractor agrees to receive payment through direct deposit to a financial institution.

Government of Canada considers privacy and security of utmost importance in the issuance of payments. Any information you provide to the Government of Canada in support of Direct Deposit is protected under the Government of Canada *Privacy Act and Access to Information Act (R.S.C., 1985, c. A-1)*.

Additional information is available at:

www.tpsgc-pwgsc.gc.ca/recgen/txt/depot-deposit-eng.html

16.0 INVOICING INSTRUCTIONS

16.1 Payment will only be made pursuant to the general conditions specified in the Appendix A and upon submission of a satisfactory invoice duly supported by specified release documents and other documents called for under the Contract.

16.2 In addition to Appendix A, Article 17, invoices must be submitted on the Contractor's own invoice form and must be prepared to show:

- Contract #
- Contract Title
- Milestone Number and Date
- Invoice Amount + Applicable taxes
- GST #

16.3 One (1) original of the invoice together with attachments, shall be forwarded to the Project Authority at the address noted in Article 6.0 hereof.

17.0 MANDATORY CERTIFICATIONS

17.1 Compliance with the certifications the Contractor has provided Canada is a condition of the Contract and subject to verification by Canada during the entire period of the Contract. In the event that the Contractor does not comply with any certification or that it is determined that any certification made by the Contractor is untrue, whether made knowingly or unknowingly, the Minister shall have the right, pursuant to the default provisions of the Contract, to terminate the Contract for default.

18.0 NON-PERMANENT RESIDENT *(the non-applicable clause will be deleted at contract award)*

18.1 (CANADIAN CONTRACTOR)

The Contractor must comply with Canadian immigration requirements applicable to foreign nationals entering Canada to work temporarily in fulfillment of the

Contract. If the Contractor wishes to hire a foreign national to work in Canada to fulfill the Contract, the Contractor should immediately contact the nearest Service Canada regional office to enquire about Citizenship and Immigration Canada's requirements to issue a temporary work permit to a foreign national. The Contractor is responsible for all costs incurred as a result of non-compliance with immigration requirements.

18.2 (FOREIGN CONTRACTOR)

The Contractor must comply with Canadian immigration legislation applicable to foreign nationals entering Canada to work temporarily in fulfillment of the Contract. If the Contractor wishes to hire a foreign national to work in Canada to fulfill the Contract, the Contractor should immediately contact the nearest Canadian Embassy, Consulate or High Commission in the Contractor's country to obtain instructions, information on Citizenship and Immigration Canada's requirements and any required documents. The Contractor is responsible to ensure that foreign nationals have the required information, documents and authorizations before performing any work under the Contract in Canada. The Contractor is responsible for all costs incurred as a result of non-compliance with immigration requirements.

19.0 INSURANCE REQUIREMENTS

19.1 The Contractor is responsible for deciding if insurance coverage is necessary to fulfill its obligation under the Contract and to ensure compliance with any applicable law. Any insurance acquired or maintained by the Contractor is at its own expense and for its own benefit and protection. It does not release the Contractor from or reduce its liability under the Contract.

GC1. Interpretation

1.1 In the contract,

"**Applicable Taxes**" means the Goods and Services Tax (GST), the Harmonized Sales Tax (HST), and any provincial tax, by law, payable by Canada such as, the Quebec Sales Tax (QST) as of April 1, 2013;

"**Canada**", "**Crown**", "**Her Majesty**" or "**the Government**" means Her Majesty the Queen in right of Canada; "**Contractor**" means the person, entity or entities named in the Contract to supply goods, services or both to Canada;

"**Minister**" means the Minister of Agriculture and Agri-Food Canada or anyone authorized;

"**Party**" means Canada, the Contractor, or any other signatory to the contract and "**Parties**" means all of them;

"**Work**" unless otherwise expressed in the Contract, means everything that is necessary to be done, furnished or delivered by the Contractor to perform the Contractor's obligations under the Contract.

GC2. Powers of Canada

All rights, remedies and discretions granted or acquired by Canada under the Contract or by law are cumulative, not exclusive.

GC3. General Conditions

The Contractor is an independent contractor engaged by Canada to perform the Work. Nothing in the Contract is intended to create a partnership, a joint venture or an agency between Canada and the other Party or Parties. The Contractor must not represent itself as an agent or representative of Canada to anyone. Neither the Contractor nor any of its personnel is engaged as an employee or agent of Canada. The Contractor is responsible for all deductions and remittances required by law in relation to its employees.

GC4. Conduct of the Work

4.1 The Contractor represents and warrants that:

- (a) It is competent to perform the Work;
- (b) It has the necessary qualifications, including knowledge, skill and experience, to perform the Work, together with the ability to use those qualifications effectively for that purpose; and

- (c) It has the necessary personnel and resources to perform the Work.
- 4.2 Except for government property specifically provided for in the Contract, the Contractor shall supply everything necessary for the performance of the Work, including all the resources, facilities, labor and supervision, management, services, equipment, materials, drawings, technical data, technical assistance, engineering services, inspection and quality assurance procedures, and planning necessary to perform the Work.
- 4.3 The Contractor shall:
- (a) Carry out the Work in a diligent and efficient manner;
 - (b) Apply as a minimum, such quality assurance tests, inspections and controls consistent with those in general usage in the trade and that are reasonably calculated to ensure the degree of quality required by the Contract; and
 - (c) Ensure that the Work:
 - (1) is of proper quality, material and workmanship;
 - (2) Is in full conformity with the Statement of Work; and
 - (3) Meets all other requirements of the Contract.
- 4.4 Notwithstanding acceptance of the Work or any part thereof, the Contractor warrants that the Work shall be of such quality as to clearly demonstrate that the Contractor has performed the Work in accordance with the undertaking in subsection 4.3.

GC5. Inspection and Acceptance

- 5.1 The Work will be subject to inspection by Canada. Should any part of the Work whether it be a report, document, good or service not be in accordance with the Contract or not be done to the satisfaction of the Canada, as submitted, Canada will have the right to reject it or require its correction at the sole expense of the Contractor before making payment.
- 5.2 The Contractor will be in default of the Contract if the Work is rejected by Canada or if he fails to correct the Work within a reasonable delay.

GC6. Amendments and Waivers

- 6.1 No design change, modification to the Work, or amendment to the Contract shall be binding unless it is incorporated into the Contract by written amendment or design change memorandum executed by the authorized representatives of Canada and of the Contractor.

- 6.2 While the Contractor may discuss any proposed changes or modifications to the scope of the Work with the representatives of Canada, Canada shall not be liable for the cost of any such change or modification until it has been incorporated into the Contract in accordance with subsection 6.1.
- 6.3 No waiver shall be valid, binding or affect the rights of the Parties unless it is made in writing by, in the case of a waiver by Canada, the Contracting Authority and, in the case of a waiver by the Contractor, the authorized representative of the Contractor.
- 6.4 The waiver by a Party of a breach of any term or condition of the Contract shall not prevent the enforcement of that term or condition by that Party in the case of a subsequent breach, and shall not be deemed or construed to be a waiver of any subsequent breach.

GC7. Time of the Essence

It is essential that the Work be performed within or at the time stated in the Contract.

GC8. Excusable delay

- 8.1 Any delay by the Contractor in performing the Contractor's obligations under the Contract which occurs without any fault or neglect on the part of the Contractor its subcontractors, agents or employees or is caused by an event beyond the control of the Contractor, and which could not have been avoided by the Contractor without incurring unreasonable cost through the use of work-around plans including alternative sources or other means, constitutes an excusable delay.
- 8.2 The Contractor shall give notice to the Minister immediately after the occurrence of the event that causes the excusable delay. The notice shall state the cause and circumstances of the delay and indicate the portion of the Work affected by the delay. When requested to do so by the Minister, the Contractor shall deliver a description, in a form satisfactory to the Minister, of work-around plans including alternative sources and any other means that the Contractor will utilize to overcome the delay and Endeavour to prevent any further delay. Upon approval in writing by the Minister of the work-around plans, the Contractor shall implement the work around plans and use all reasonable means to recover any time lost as a result of the excusable delay.
- 8.3 Unless the Contractor complies with the notice requirements set forth in the Contract, any delay that might have constituted an excusable delay shall be deemed not to be an excusable delay.
- 8.4 If an excusable delay has continued for thirty (30) days or more, Canada may, by giving notice in writing to the Contractor, terminate the Contract. In such a case,

- the Parties agree that neither will make any claim against the other for damages, costs, expected profits or any other loss arising out of the termination or the event that contributed to the excusable delay. The Contractor agrees to repay immediately to Canada the portion of any advance payment that is unliquidated at the date of the termination.
- 8.5 Unless Canada has caused the delay by failing to meet an obligation under the Contract, Canada will not be responsible for any cost incurred by the contractor or any subcontractors or agents as a result of an excusable delay.
- 8.6 If the Contract is terminated under this section, Canada may require the Contractor to deliver to Canada, in the manner and to the extent directed by Canada, any completed parts of the Work not delivered and accepted before the termination and anything that the Contractor has acquired or produced specifically to perform the Contract. Canada will pay the Contractor:
- (a) The value, of all completed parts of the Work delivered to and accepted by Canada, based on the Contract price, including the proportionate part of the Contractor's profit or fee included in the Contract price; and
 - (b) The cost to the Contractor that Canada considers reasonable in respect of anything else delivered to and accepted by Canada.
- 8.7 The total amount paid by Canada under the Contract to the date of termination and any amounts payable under this subsection must not exceed the Contract price.

GC9. Termination of convenience

- 9.1 Notwithstanding anything in the Contract, the Minister may, by giving notice to the Contractor, terminate or suspend the Contract immediately with respect to all or any part or parts of the Work not completed.
- 9.2 All Work completed by the Contractor to the satisfaction of Canada before the giving of such notice shall be paid for by Canada in accordance with the provisions of the Contract and, for all Work not completed before the giving of such notice, Canada shall pay the Contractor's costs as determined under the provisions of the Contract in an amount representing a fair and reasonable fee in respect of such Work.
- 9.3 In addition to the amount which the Contractor shall be paid under section GC9.2, the Contractor shall be reimbursed for the Contractor's cost of and incidental to the cancellation of obligations incurred by the Contractor pursuant to such notice and obligations incurred by or to which the Contractor is subject with respect to the Work.

- 9.4 The Contractor shall have no claim for damages, compensation, loss of profit, allowance or otherwise by reason of or directly or indirectly arising out of any action taken or notice given by Canada under the provisions of section GC9 except as expressly provided therein.
- 9.5 Upon termination of the Contract under section GC9.1, Canada may require the Contractor to deliver and transfer title to Canada, in the manner and to the extent directed by Canada, any finished Work which has not been delivered prior to such termination and any material, goods or Work-in-progress which the Contractor specifically acquired or produced for the fulfillment of the Contract.

GC10. Termination due to Default of Contractor

- 10.1 Canada may by notice to the Contractor, terminate the whole or any part of the Contract:
- (a) If the Contractor fails to perform any of the Contractor's obligations under the Contract or in Canada's view, so fails to make progress so as to endanger performance of the Contract in accordance with its terms;
 - (b) To the extent permitted under law, if the Contractor becomes bankrupt or insolvent, or a receiving order is made against the Contractor, or an assignment is made for the benefit of creditors, or if an order is made or resolution passed for the winding up of the Contractor, or if the Contractor takes the benefit of a statute relating to bankrupt or insolvent debtors; or
 - (c) If the Contractor makes a false declaration under GC 37 or GC 38 or fails to comply with the terms set out in GC 16.3 or GC 39.
- 10.2 Upon termination of the Contract under section GC10, the Contractor shall deliver to Canada any finished Work which has not been delivered and accepted prior to such termination, together with materials and Work-in-progress relating specifically to the Contract and all materials, texts and other documents supplied to the Contractor in relation to the Contract.
- 10.3 Subject to the deduction of any claim which Canada may have against the Contractor arising under the Contract or out of termination, payment will be made by Canada to the Contractor for the value of all finished Work delivered and accepted by Canada, such value to be determined in accordance with the rate(s) specified in the Contract, or, where no rate is specified, on a proportional basis.
- 10.4 If the contract is terminated pursuant to GC 10.1(c), in addition to any other remedies that may be available against the Contractor, the Contractor will immediately return any advance payments.

GC11. Suspension of Work

- 11.1 The Minister may at any time, by written notice, order the Contractor to suspend or stop the Work or part of the Work under the Contract. The Contractor must immediately comply with any such order in a way that minimizes the cost of doing so.

GC12. Extension of Contract

- 12.1 Where the Minister determines that additional work of the same nature as the Work described in this Contract is required, the Contractor shall do such work and where required the term of the Contract shall be extended accordingly and confirmed in writing between the parties.
- 12.2 Payment for the work described in subsection 1 shall be calculated and paid on the same basis as in section GC12 and where required prorated.
- 12.3 Where the Minister has determined that the Contractor shall be paid expenses related to the Work described in section GC12.1, the type of expenses and amounts shall be confirmed in writing between the parties.

GC13. Method of Payment

- 13.1 Payment in the case of progress payments:
- (a) Payment by Canada to the Contractor for the Work shall be made within 30 days following the date on which a claim for progress payment is received according to the terms of the Contract; and
 - (b) If the Minister has any objection to the form of the claim for payment or the substantiating documentation, shall, within 15 days of its receipt, notify the Contractor in writing of the nature of the objection.
- 13.2 Payment in the case of payment on completion:
- (a) Payment by Canada to the Contractor for the Work shall be made within 30 days following the date on which the Work is completed or on which a claim for payment and substantiating documentation are received according to the terms of the Contract, whichever date is the later;
 - (b) If the Minister has any objection to the form of the claim for payment or the substantiating documentation, shall, within 15 days of its receipt, notify the Contractor in writing of the nature of the objection.

GC14. Basis of Payment

- 14.1 A claim in the form of an itemized account certified by the Contractor with respect to the accuracy of its contents shall be submitted to the Minister.
- 14.2 Travel and other expenses, where allowed by the Contract, shall be paid in accordance with Treasury Board Guidelines and Directives, certified by the Contractor as to the accuracy of such claim.

GC15. Interest on Overdue Accounts

- 15.1 For the purposes of this clause:
- (a) **"Average Rate"** means the simple arithmetic mean of the bank rates in effect at 4:00 p.m. Eastern Standard Time each day during the calendar month which immediately precedes the calendar month in which payment is made;
 - (b) **"Bank rate"** means the rate of interest established from time to time by the Bank of Canada as the minimum rate at which the Bank of Canada makes short term advances to members of the Canadian Payments Association;
 - (c) **"Date of payment"** means the date of the negotiable instrument drawn by the Receiver General for Canada and given for payment of an amount due and payable;
 - (d) an amount is **"due and payable"** when it is due and payable by Canada to the Contractor in accordance with the terms of the Contract; and
 - (e) An amount becomes **"overdue"** when it is unpaid on the first day following the day upon which it is due and payable.
- 15.2 Canada shall be liable to pay to the Contractor simple interest at the Average Bank of Canada discount rate from the previous month plus 3 percent per annum on any amount that is overdue from the date such amount becomes overdue until the day prior to the date of payment, inclusive. The Contractor is not required to provide notice to Canada for interest to be payable.
- 15.3 Canada shall not be liable to pay interest in accordance with this clause if Canada is not responsible for the delay in paying the Contractor.
- 15.4 Canada shall not be liable to pay interest on overdue advance payments.

GC16. Records to be kept by Contractor

- 16.1 The Contractor must keep proper accounts and records of the cost of performing the Work and of all expenditures or commitments made by the Contractor in connection with the Work, including all invoices, receipts and vouchers. The Contractor must retain records, including bills of lading and other evidence of transportation or delivery, for all deliveries made under the Contract.
- 16.2 If the Contract includes payment for time spent by the Contractor, its employees, representatives, agents or subcontractors performing the Work, the Contractor must keep a record of the actual time spent each day by each individual performing any part of the Work.
- 16.3 Unless Canada has consented in writing to its disposal, the Contractor must retain all the information described in this section for six (6) years after it receives the final payment under the Contract, or until the settlement of all outstanding claims and disputes, whichever is later. During this time, the Contractor must make this information available for audit, inspection and examination by the representatives of Canada, who may make copies and take extracts. The Contractor must provide all reasonably required facilities for any audit and inspection and must furnish all the information as required so the representatives of Canada may perform a complete audit of the Contract.
- 16.4 The amount claimed under the Contract, calculated in accordance with the Basis of Payment provision in the Articles of Agreement, is subject to government audit both before and after payment is made. If an audit is performed after payment, the Contractor agrees to repay any overpayment immediately on demand by Canada. Canada may hold back, deduct and set off any credits owing and unpaid under this section from any money that Canada owes to the Contractor at any time (including under other Contracts). If Canada does not choose to exercise this right at any given time, Canada does not lose this right.

GC17. Invoice Submission

- 17.1 Invoices must be submitted in the Contractor's name. The Contractor must submit invoices for each delivery or shipment; invoices must only apply to the Contract. Each invoice must indicate whether it covers partial or final delivery.
- 17.2 Invoices must show:
 - (a) the date, the name and address of the client department, item or reference numbers, deliverable and/or description of the Work, contract number, Client Reference Number (CRN), Procurement Business Number (PBN), and financial code(s);

- (b) details of expenditures (such as item, quantity, unit of issue, unit price, fixed time labour rates and level of effort, subcontracts, as applicable) in accordance with the Basis of Payment, exclusive of Applicable Taxes;
 - (c) deduction for holdback, if applicable;
 - (d) the extension of the totals, if applicable; and
 - (e) if applicable, the method of shipment together with date, case numbers and part or reference numbers, shipment charges and any other additional charges.
- 17.3 Applicable Taxes must be specified on all invoices as a separate item along with corresponding registration numbers from the tax authorities. All items that are zero-rated, exempt or to which Applicable Taxes do not apply, must be identified as such on all invoices.
- 17.4 By submitting an invoice, the Contractor certifies that the invoice is consistent with the Work delivered and is in accordance with the Contract.

GC18. Right of Set off

Without restricting any right of set off given by law, the Minister may set off against any amount payable to the Contractor under the Contract, any amount payable to Canada by the Contractor under the Contract or under any other current contract. Canada may, when making a payment pursuant to the Contract, deduct from the amount payable to the Contractor any such amount payable to Canada by the Contractor which, by virtue of the right of set off, may be retained by Canada.

GC19. Assignment

- 19.1 The Contract shall not be assigned in whole or in part by the Contractor without the prior written consent of Canada and an assignment made without that consent is void and of no effect.
- 19.2 An assignment of the Contract does not relieve the Contractor from any obligation under the Contract or impose any liability upon Canada.

GC20. Subcontracting

- 20.1 The Contractor must obtain the consent in writing of the Minister before subcontracting.
- 20.2 Subcontracting does not relieve the Contractor from any of its obligations under the Contract or impose any liability upon Canada to a subcontractor.

- 20.3 In any subcontract, the Contractor will bind the subcontractor by the same conditions by which the contractor is bound under the Contract.

GC21. Indemnification

- 21.1 The Contractor shall indemnify and save harmless Canada from and against all claims, losses, damages, costs, expenses, actions and other proceedings, made, sustained, brought, prosecuted, threatened to be brought or prosecuted, in any manner based upon, occasioned by or attributable to any injury to or death of a person or damage to or loss of property arising from any willful or negligent act, omission or delay on the part of the Contractor, the Contractor's servants, subcontractors or agents in performing the Work or as a result of the Work.
- 21.2 The Contractor's liability to indemnify or reimburse Canada under the Contract shall not affect or prejudice Canada from exercising any other rights under law.

GC22. Confidentiality

The Contractor shall treat as confidential, during as well as after performance of the Work, any information to which the Contractor becomes privy as a result of acting under the Contract. The Contractor shall use its best efforts to ensure that its servants, employees, agents, subcontractors or assigned observe the same standards of confidentiality.

GC23. Indemnification - Copyright

The Contractor shall indemnify Canada from and against all costs, charges, expenses, claims, actions, suits and proceedings for the infringement or alleged infringement of any copyright resulting from the performance of the Contractor's obligations under the Contract, and in respect of the use of or disposal by Canada of anything furnished pursuant to the Contract.

GC24. Indemnification - Inventions, etc.

The Contractor shall indemnify Canada from and against all costs, charges, expenses, claims, actions, suits and proceedings for the use of the invention claimed in a patent, or infringement or alleged infringement of any patent or any registered industrial design resulting from the performance of the Contractor's obligations under the Contract, and in respect of the use of or disposal by Canada of anything furnished pursuant to the Contract.

GC25. Ownership of Copyright

- 25.1 Anything that is created or developed by the Contractor as part of the Work under the Contract in which copyright subsists belongs to Canada. The Contractor must

incorporate the copyright symbol and either of the following notices, as appropriate:

© HER MAJESTY THE QUEEN IN RIGHT OF CANADA (year)

or

© SA MAJESTÉ LA REINE DU CHEF DU CANADA (année).

- 25.2 At the request of the Minister, the Contractor must provide to Canada, at the completion of the Work or at such other time as the Minister may require a written permanent waiver of Moral Rights, in a form acceptable to the Minister, from every author that contributed to the Work. If the Contractor is an author, the Contractor permanently waives the Contractor's Moral Rights.

GC26. Taxes

26.1 Municipal Taxes

Municipal Taxes do not apply.

- 26.2 Federal government departments and agencies are required to pay Applicable Taxes.

- 26.3 Applicable Taxes will be paid by Canada as provided in the Invoice Submission section. It is the sole responsibility of the Contractor to charge Applicable Taxes at the correct rate in accordance with applicable legislation. The Contractor agrees to remit to appropriate tax authorities any amounts of Applicable Taxes paid or due.

- 26.4 The Contractor is not entitled to use Canada's exemptions from any tax, such as provincial sales taxes, unless otherwise specified by law. The Contractor must pay applicable provincial sales tax, ancillary taxes, and any commodity tax, on taxable goods or services used or consumed in the performance of the Contract (in accordance with applicable legislation), including for material incorporated into real property.

- 26.5 In those cases where Applicable Taxes, customs duties, and excise taxes are included in the Contract Price, the Contract Price will be adjusted to reflect any increase, or decrease, of Applicable Taxes, customs duties, and excise taxes that will have occurred between bid submission and contract award. However, there will be no adjustment for any change to increase the Contract Price if public notice of the change was given before bid submission date in sufficient detail to have permitted the Contractor to calculate the effect of the change.

26.6 Tax Withholding of 15 Percent

Pursuant to the Income Tax Act, 1985, c. 1 (5th Supp.) and the Income Tax Regulations, Canada must withhold 15 percent of the amount to be paid to the Contractor in respect of services provided in Canada if the Contractor is a non-resident, unless the Contractor obtains a valid waiver. The amount withheld will be held on account for the Contractor in respect to any tax liability which may be owed to Canada.

GC27. International Sanctions

27.1 Persons in Canada, and Canadians outside of Canada, are bound by economic sanctions imposed by Canada. As a result, the Government of Canada cannot accept delivery of goods or services that originate, either directly or indirectly, from the countries or persons subject to economic sanctions.

Details on existing sanctions can be found at:

<http://www.international.gc.ca/sanctions/index.aspx?lang=eng>.

27.2 The Contractor must not supply to the Government of Canada any goods or services which are subject to economic sanctions.

27.3 The Contractor must comply with changes to the regulations imposed during the period of the Contract. The Contractor must immediately advise Canada if it is unable to perform the Work as a result of the imposition of economic sanctions against a country or person or the addition of a good or service to the list of sanctioned goods or services. If the Parties cannot agree on a work around plan, the Contract will be terminated for convenience in accordance with section GC9.

GC28. T1204 Government Service Contract Payment

28.1 Pursuant to regulations made pursuant to paragraph 221 (1)(d) of the Income Tax Act, payments made by departments and agencies to Contractors under applicable services Contracts (including Contracts involving a mix of goods and services) must be reported on a T1204 Government Service Contract Payment. To enable client departments and agencies to comply with this requirement, Contractors are required to provide information as to their legal name and status, business number, and/or Social Insurance Number or other supplier information as applicable, along with a certification as to the completeness and accuracy of the information.

GC29. Successors and Assigns

The Contract shall enure to the benefit of and be binding upon the parties hereto and their lawful heirs, executors, administrators, successors and assigns as the case may be.

GC30. Conflict of Interest and Values and Ethics Codes for the Public Service

The Contractor acknowledges that individuals who are subject to the provisions of the Conflict of Interest Act, 2006, c. 9, s. 2, the Conflict of Interest Code for Members of the House of Commons, any applicable federal values and ethics code or any applicable federal policy on conflict of interest and post-employment shall not derive any direct benefit resulting from the Contract unless the provision or receipt of such benefit is in compliance with such legislation and codes.

GC31. No Bribe

The Contractor declares that no bribe, gift, benefit, or other inducement has been or will be paid, given, promised or offered directly or indirectly to any official or employee of Canada or to a member of the family of such a person, with a view to influencing the entering into the Contract or the administration of the Contract.

GC32. Errors

Notwithstanding any other provision contained in this Contract, no amount shall be paid to the Contractor based on the cost of Work incurred to remedy errors or omissions for which the Contractor or his servants, agents or subcontractors are responsible, and such errors or omissions shall be remedied at the Contractor's cost, or, at the option of Canada, the Contract may be terminated and in that event the Contractor shall receive payment only as determined under section GC10.

GC33. Performance

The failure of Canada to require performance by the Contractor of any provision of this Contract shall not affect the right of Canada thereafter to enforce such provision, nor shall the waiver by Canada of any breach of any term of the Contract be taken or held to be a waiver of any further breach of the same or any other term or condition.

GC34. Gender

Whenever the singular or masculine is used throughout this Contract, it shall be construed as including the plural, feminine, or both whenever the context and/or the parties hereto so require.

GC35. Survival

All the Parties' obligations of confidentiality, representations and warranties set out in the Contract as well as any other the provisions, which by the nature of the rights or obligations might reasonably be expected to survive, will survive the expiry or termination of the Contract.

GC36. Severability

If any provision of the Contract is declared by a court of competent jurisdiction to be invalid, illegal or unenforceable, that provision will be removed from the Contract without affecting any other provision of the Contract.

GC37. Contingency Fees

The Contractor certifies that it has not, directly or indirectly, paid or agreed to pay and agrees that it will not, directly or indirectly, pay a contingency fee for the solicitation, negotiation or obtaining of the Contract to any person, other than an employee of the Contractor acting in the normal course of the employee's duties. In this section, "contingency fee" means any payment or other compensation that depends or is calculated based on a degree of success in soliciting, negotiating or obtaining the Contract and "person" includes any individual who is required to file a return with the registrar pursuant to section 5 of the Lobbying Act, 1985, c. 44 (4th Supplement).

GC38. Integrity Provisions

The Ineligibility and Suspension Policy (the "Policy") and all related Directives (2016- 04-04) are incorporated into, and form a binding part of the Contract. The Contractor must comply with the provisions of the Policy and Directives, which can be found on Public Works and Government Services Canada's website at [*Ineligibility and Suspension Policy*](#).

GC39. Public Disclosure

- 39.1 The Contractor consents, in the case of a contract that has a value in excess of \$10,000, to the public disclosure of basic information - other than information described in any of paragraphs 20(1)(a) to (d) of the Access to Information Act - relating to the contract.
- 39.2 The contractor consents, in the case of a contract with a former public servant in receipt of a Public Servant Superannuation (PSSA) pension, that the contractor's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports described in 39.1.

GC40. Notice

Any notice under the Contract must be in writing and may be delivered by hand, courier, mail, facsimile or other electronic method that provides a paper record of the text of the notice. It must be sent to the Party for whom it is intended at the address stated in the Contract. Any notice will be effective on the day it is received at that address. Any notice to Canada must be delivered to the Minister.

GC41. Accuracy

The Contractor represents and warrants that the information submitted with its bid is accurate and complete. The Contractor acknowledges that the Minister has relied upon such information in entering into this Contract. This information may be verified in such manner as the Minister may reasonably require.

GC42. Dispute Resolution Services

The parties understand that the Procurement Ombudsman appointed pursuant to subsection 22.1 (1) of the Department of Public Works and Government Services Act will, on request of a party, provide a proposal for an alternative dispute resolution process to resolve any dispute arising between the parties respecting the interpretation or application of a term or condition of this contract. The parties may consent to participate in the proposed alternative dispute resolution process and to bear the cost of such process. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by email at boa.opo@boa.opo.gc.ca.

GC43. Contract Administration

The parties understand that the Procurement Ombudsman appointed pursuant to Subsection 22.1 (1) of the Department of Public Works and Government Services Act will review a complaint filed by the contractor respecting administration of this contract if the requirements of Subsection 22.2 (1) of the Department of Public Works and Government Services Act and Section 15 and 16 of the Procurement Ombudsman Regulations have been met, and the interpretation and application of the terms and conditions and the scope of the work of this contract are not in dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by email at boa.opo@boa.opo.gc.ca.

GC44. Entire Agreement

The Contract constitutes the entire agreement between the Parties relative to the subject procurement and supersedes all previous negotiations, communications and other agreements, whether written or oral, unless they are incorporated by reference in the Contract. There are no terms, covenants, representations, statements or conditions relative to the subject procurement binding on the Parties other than those contained in the Contract.

1.0 INTRODUCTION

In Canada, providing clean, safe and reliable drinking water that meet *Guidelines for Canadian Drinking Water Quality (GCDWQ)* is the responsibility of the provincial and territorial governments. Federal government also shares this responsibility when it supplies the drinking water to federal lands and facilities. To aide federal departments in providing safe drinking water, Health Canada has published a guidance document “*Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction*”(GCDWQ, 2013). Agriculture and Agri-Food Canada (AAFC), as a purveyor of drinking water in departmentally owned facilities, is also obligated under the Canada Labour Code – Part II, section 125(1) (j) and under the National Joint Council Occupational Health and Safety Directive Part IX – Sanitation section 9.4., to provide safe drinking water to its employees. As part of meeting AAFC obligation to ensure safe drinking water is provided at AAFC facilities, AAFC has created standards and guidelines, and has implemented site specific Potable Water Quality Management Programs, based on site specific requirements. Currently, the majority of AAFC sites do not have an up to date site specific water quality plan, and in some cases, only partial plans have been developed.

AAFC Potable Water Guidelines and Standards are based on the principles outlined in the “*Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction*”(GCDWQ, 2013) published by Health Canada. Potable Water Guidelines and Standards for Agriculture and Agri-Food Canada (AAFC) are designed to meet the specific needs of AAFC water supply systems. The Potable Water Guidelines and Standards for AAFC provide water quality reporting tools and an approach to due diligence through detailed, clear and consistent requirements that ensure the provision of safe drinking water. The Potable Water Guidelines and Standards take into consideration the unique characteristics of AAFC systems and are designed to be practical, so they are easy to understand and implement by AAFC operational staff. AAFC’s Guidelines and Standards for Potable Water have not been updated since 2007.

As part of meeting AAFC’s obligation to ensure safe drinking water is provided at AAFC facilities, AAFC has implemented a site specific Potable Water Quality Management Program based on site specific requirements. Currently, only 7 sites of 19 have formal Potable Water Quality Management Programs, albeit most sites have an informal water sampling program. Formal programs are required for each site.

This project will result in an updated departmental guideline and standards for potable water quality management, and updated site specific potable water quality management templates and plans. The guidelines and standards and the site specific plan templates will be completed by the consultant with support from the AAFC Water Quality Aspect Lead and AAFC Facility Managers (site personnel).

All contract administration will be handled by the AAFC Western Service Centre and project management will be handled by AAFC Environmental Services.

2.0 OBJECTIVES

To secure consulting services to review and update the Agriculture and Agri-Food Canada Guidelines and Standards for Potable Water Quality Management, and to create a template(s) for site specific Potable Water Quality Management Plans (full and simplified versions, Phase I).

Optional work to populate templates and develop site specific Potable Water Quality Management Plans may be exercised (Phase II).

3.0 SCOPE OF THE WORK

The work to be completed shall include, but is not necessarily limited to the following:

3.1 PHASE I

Phase I will consist of reviewing, edit and updating of the AAFC Potable Water Guidelines and Standards, and the development of templates for the site specific Potable Water Quality Management Plans (full version template for each RDC and simplified template for the satellite sites). The templates should allow easy population by AAFC facility managers to make the development of the plan more efficient and effectual for the consultant. Efficiencies and duplication of information between the Departmental Guideline and site specific plans should be identified. Any sections in the site specific plans that are common to all plans can be removed and amalgamated with the Departmental Guideline. The goal is to streamline the site specific Potable Water Quality Management Programs for ease of use by AAFC stakeholders.

3.1.1 AAFC Potable Water Guidelines and Standards (Appendix I):

- Review, edit and update the document to align with applicable federal and/or provincial guidelines, standards and guidance documents for example: Health Canada's *Guidelines for Canadian Drinking Water Quality*, National Plumbing Code, Canadian Labor Code, National Joint Council Occupational Health and Safety Directive, **Health Canada's *Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction***, any provincial water quality guidelines and standards, and any other relevant training guides (Interdepartmental Working Group on Drinking Water Training series), guidelines and standards.
- Updated federal guidelines for sampling of municipally supplied water should be included and indicated in perspective tables, text and appendices.
- Review and update all Tables:
 - Table 1.0 requires review, revision and simplification
 - Table 2.0 requires population
- Review and update all Appendices. Recommendations for updating but not limited to the following:

- Appendix II:
 - Update, simplify and reformat templates in Appendix II to make population easier and more efficient for facility managers and site personnel. (Template II to VI).
 - Update and simplify the Sanitary Surveys and Cross Connection Control inspection check list so site personnel can possibly perform the surveys and inspections themselves, in order to lengthen the time between formal surveys or to identify risk areas, for discussion with Facility Managers (FM) and PM.
 - Determine reasonable activities for the facility managers to conduct (especially in regards to sanitary surveys and cross connection control studies) and modify any reporting templates as such. Significant modification must be approved by the AAFC Project Manager.
 - Template 2: Potable Water System Annual Report to include section on any changes or perceived risks to the water system.
- Appendix V: Micro-systems training course. Remove and replace with Water Sampling Procedures (for bacteriological, lead, metals, nutrients, chlorine residual, and any other relevant procedures as required). The Interdepartmental Water Quality Drinking Board Training series of training may be used for reference.
- Appendix VI: Dechlorination (ensure discussion about dechlorination regulations (Environment Canada) when flushing and discharging to a wastewater system in main text). Ensure regulation still exists.
- Appendix VII: Flushing. Contract example for flushing water lines may not be appropriate or helpful, to discuss with FM's, may be removed if not deemed helpful. Include flushing tracking spreadsheet and pertinent sections of the document *Environmental and Potable Water Compliance at Custodial Facilities During COVID-19 Operational Reductions, April 29, 2020* (to be supplied) and include flushing protocols during regular operation, limited occupancy and after construction
- Appendix IV: Include titles on tables and formatting and other revisions to clarify
- Appendix X: Update/revise
- Add appendix on Water Conservation tracking check list or reporting format
- Any reference to WaterTrax should be removed and replaced with appropriate verbiage
- Add a Conclusion to the document
- References require updating

3.1.2 Potable Water Quality Management Plans templates

- Develop a template for the Potable Water Quality Management plans. The Lethbridge Potable Water Quality Management plan may be used as a starting template for the full site plans, with updating as required (i.e. Appendix B requires updating for Lead sampling). The plans should be streamlined and simplified for ease of use by the facility managers. Refer to Appendix II for template.
- Develop a template for the satellite sites. This may be a simplified version of the full plans, however all pertinent data and information must be included. The simplified plans will be incorporated into associated RDC plan.
- Efficiencies and duplication of information between the Departmental Guideline and site specific plans should be identified. Any sections in the site specific plans that are common to all plans can be removed and amalgamated with the Departmental Guideline.
- The Potable Water Quality Management plans should clarify those site specific parameters required for sampling (if not available from supplier), especially for Chemical (Organic and Inorganic) and Radionuclide parameters
- Include a section on water conservation, and where and when to monitor water usage
- A flushing protocol should be established for seasonal sites

3.2 PHASE II (Optional Work)

3.2.1 Potable Water Quality Management Plans:

This phase would include the population of the Potable Water Quality Management Plans templates by the facility managers with help from the consultant. Once the templates are populated, the consultant will edit, review and finalize the plans. Note the majority of sites are on municipally supplied sources (all of the 19 RDC sites and 14 satellite sites are on municipal sources) and only 7 satellite sites are on privately treated well water, thus simplifying plan development. Refer to Table 1 for a list of sites and plans required.

- Populate the potable water quality management plan templates for 12 RDC sites (refer to Appendix II for sample)
- Populate simplified water quality management plan template for 20 satellite sites to create and develop a complete simplified plan
- The simplified satellite site plans will be included/amalgamated with the associated RDC plan
- Review and update plans with new template for the 7 RDC sites with an existing plan
- If, after consultation with the facility manager (FM), it is determined that a water quality management plan is not required for the associate satellite sites, one will not be developed (upon approval by PM)

- Larger satellite sites may require and benefit from a full site specific plan instead of a simplified plan, this shall be determined by consultation with the FM and PM
- Develop a risk matrix for each site and/or identify risks
- Review of past water quality data will be required to develop plan
- Consideration of communication should be given to francophone sites

Table 1: Potable Water Quality Management Plans and Action Required

Count	Prov.	RDC or Satellite	Facility Name	Action Required
1	BC	RDC	Summerland Research and Development Centre	Develop
2	BC	RDC	Agassiz Research and Development Centre	Develop
3	MB	RDC	Brandon Research and Development Centre	Develop
4	NB	RDC	Fredericton Research and Development Centre	Develop
5	NS	RDC	Kentville Research and Development Centre	Develop
6	ON	RDC	London Research and Development Centre	Develop
7	QC	RDC	Sherbrooke Research and Development Centre	Develop
8	QC	RDC	Saint-Hyacinthe Research and Development Centre	Develop
9	QC	RDC	St. Jean Research and Development Centre	Develop
10	QC	RDC	Quebec Research and Development Centre	Develop
11	SK	RDC	Saskatoon Research and Development Centre	Develop
12	SK	RDC	Swift Current Research and Development Centre	Develop
13	AB	RDC	Lacombe Research and Development Centre	Review & Edit
14	AB	RDC	Lethbridge Research and Development Centre	Review & Edit
15	MB	RDC	Morden Research and Development Centre	Review & Edit
16	NFLD	RDC	St.Johns Research and Development Centre	Review & Edit
17	ON	RDC	Ottawa Research and Development Centre	Review & Edit
18	ON	RDC	Harrow Research and Development Centre	Review & Edit
19	PEI	RDC	Charlottetown Research and Development Centre	Review & Edit
1	AB	Satellite	Beaverlodge Research Farm	Simplified
2	BC	Satellite	Abbotsford Research Farm	Simplified
3	MB	Satellite	Canada Manitob Crop Diversification Centre - Portage la Prairie	Simplified
4	MB	Satellite	Canada Manitob Crop Diversification Centre - Carberry	Simplified
5	PEI	Satellite	Harrington Research Farm	Simplified
6	MB	Satellite	Canada Manitob Crop Diversification Centre - Winkler	Simplified
7	NB	Satellite	Benton Ridge Research Farm	Simplified
8	NS	Satellite	Nappan Research Farm	Simplified
9	ON	Satellite	Whelan Experimental Farm (Woodslee Research Farm)	Simplified
10	ON	Satellite	Jordan Research Farm	Simplified
11	ON	Satellite	Jerseyville Research Farm	Simplified
12	QC	Satellite	L'Acadie Research Farm	Simplified
13	QC	Satellite	Sainte-Clothilde Research Farm	Simplified
14	QC	Satellite	Normandin Research Farm	Simplified
15	QC	Satellite	Fraleighsburg Research Farm	Simplified
16	SK	Satellite	Saskatoon Lowe Road Field Site	Simplified
17	SK	Satellite	Canada Sask Irrigation Diversification Centre Outlook	Simplified
18	SK	Satellite	Melfort Research Farm	Simplified
19	SK	Satellite	Indian Head Research Farm	Simplified
20	SK	Satellite	Scott Research Farm	Simplified

3.3 Data Collection and Review:

Review and collect all existing project documentation (existing drawings, building plans and locations, sampling plans, water quality reports, studies (CCC, SS, GUDI studies), guidelines and standards documents, codes, etc. Information may be provided by AAFC in the form of electronic copy and when available in AutoCAD format data files. A large amount of information is retained on an Arc GIS web based application, in which the consultant will have access to.

The Consultant will need to liaise and collaborate with the AAFC Facility Managers to retrieve required data to update templates and site specific plans (site layout, structure list, building details, current sampling program, water quality results, any water quality issues, and any other relevant information). The consultant will need to determine reasonable activities for the facility managers to conduct (especially in regards to sanitary surveys and cross connection control studies) and modify any reporting templates as such. Significant modification must be approved by the AAFC Project Manager.

It is not expected that travel to every RDC site or satellite sites will be required, nor is travel to each site considered in this proposal.

No water sampling is expected in this proposal, the plans in Phase II will be based on past water quality analysis.

3.4 Methodology, Work plan and Timeline

The proposal shall include a methodology or approach for development of the AAFC Guidelines and Standards as well as for Potable Water Quality Management site specific templates (Phase I). This should include a detailed breakdown of the various tasks or steps to complete the work in a logical and efficient sequence. The proposal shall include a work plan and work breakdown structure including milestones and timelines.

The proposal shall include a methodology or approach for Phase II (optional work), population and development of the Potable Water Quality Management site specific plans. This should include a detailed breakdown of the various tasks or steps to complete the work in a logical and efficient sequence. The proposal shall include a work plan and work breakdown structure including milestones and timelines.

Phase II (optional work) site specific plan development shall include a communication plan consisting of most appropriate modes of communications and consideration for francophone communication. AAFC will assist with francophone communication to the best of their ability.

Consideration should be given to the most efficient approach for data collection and template population, due to the volume of plans and information required (i.e. one on one meetings with FMs vs larger group meeting with all FMs).

3.5 Deliverables:

Draft reports must be approved by AAFC prior to issuing the final reports. The Consultant will prepare a final version of the reports: two hard copies and one electronic copy of each of the reports.

AAFC representatives (PM, facility managers, other AAFC team members) will review the draft reports within six weeks of receiving the report. The AAFC PM will combine all comments and provide to the Consultant. All comments must be addressed in the final report. Comments that cannot be addressed in the final report will be responded to in writing and, if possible, a meeting will be held to reconcile differences and finalize the report.

3.5.1 Phase I

Draft Reports (on or before December 1, 2020):

- One (1) draft report will be created for the AAFC Potable Water Guidelines and Standards,
- One (1) draft template for the Potable Water Quality Management Programs will be provided.
- One (1) draft template for the simplified Potable Water Quality Management Programs will be provided.

Final Reports (on or before March 20, 2021):

- One (1) final report will be created for the AAFC Potable Water Guidelines and Standards,
- One (1) final template for the Potable Water Quality Management Programs will be provided.
- One (1) final template for the simplified Potable Water Quality Management Programs will be provided.

3.5.2 Phase II (Optional Work)

Draft Reports (on or before September 30, 2021):

- Nineteen (19) draft Potable Water Quality Management Program plans for RDC sites
- Twenty (20) draft simplified Potable Water Quality Management Program plans for satellite sites

Final Reports (on or before February 28, 2022):

- Nineteen (19) final Potable Water Quality Management Program plans for RDC sites

- Twenty (20) final simplified Potable Water Quality Management Program plans for satellite sites

Note: Due to merging of satellite site plans with associated RDC plans, the final number of reports may vary.

3.6 Meetings to Review Progress

The work plan for each phase should allow for at least four formal meetings (in person, video conference or teleconference as determined by PM/Consultant). Meetings can be arranged as required and are not limited to:

- 1) The first meeting to start-up the project;
- 2) The second meeting to be held subsequent to the completion of draft documents
- 3) The third meeting to be held for review and discussion of the draft documents, prior to completion of the final draft
- 4) The fourth meeting to present the final draft of all documents

BASIS OF PAYMENT

APPENDIX C

1.0 General

Payment shall be in accordance with **article 14.0 of Part 3, Method of Payment and 15.0 of Part 3, Direct Deposit.**

All deliverables FOB destination, Canadian custom duties and excise tax (if applicable). If applicable, Applicable Taxes for the labour will be shown separately.

2.0 Pricing Basis

The Contractor shall be paid in accordance with the following for work performed under the Contract.

Milestone No.	Deliverable	Firm Amount <i>(to be inserted at contract award)</i>
1	Phase 1 – Draft Report	
2	Phase 1 – Final Report	
Optional Work		
3	Phase 2 – Draft Report	
4	Phase 2 – Final Report	

Travel and Living Expenses

No travel will be reimbursed under this contract

HIGHEST COMBINED SCORE WITH WEIGHTINGS

TECHNICAL PROPOSAL

It is essential that the elements contained in the Proposal be stated in a clear manner and in sufficient depth to allow for evaluation by the evaluation team.

1.0 METHOD OF SELECTION – HIGHEST COMBINED SCORE OF TECHNICAL MERIT AND PRICE

- 1.1 The evaluation process is designed to identify the most qualified contractor to provide services as stipulated in the Statement of Work (Appendix B).
- 1.2 This section comprises the detailed Proposal requirements that will be used to evaluate Bidders’ responses to the RFP.
- 1.3 The mandatory requirements under section 2.0 will be evaluated on a compliant/non-compliant basis. The Proposals must include the necessary documentation to demonstrate this compliance.
- 1.4 The selection of the responsive Proposal will be made on the basis of the **HIGHEST COMBINED SCORE** for both the technical and financial proposals. The combined scores will be determined by adding the technical and financial points obtained.

The Bidders’ Technical and Financial proposals will be scored separately. An Overall Proposal Score will be determined by combining a Bidder’s Technical Proposal Score and Financial Proposal Score in accordance with the following weights:

Technical Proposal	=	70%
Financial Proposal	=	30%
Overall Proposal	=	100%

Formula:

$$\frac{\text{Technical Score} \times \text{Ratio (70)}}{\text{Max Points}} + \frac{\text{Lowest Price} \times \text{Ratio (30)}}{\text{Bidder's Price}} = \text{Overall Score}$$

1.5 To be considered Responsive, a Proposal Must:

Meet all the mandatory requirements specified in section 2.0 below;

- 1.6 The price of the Proposal will be evaluated in CANADIAN DOLLARS, Applicable Taxes excluded, FOB destination for goods/services, Customs Duties and Excise Taxes included.
- 1.7 Failure of a Proposal to provide information in sufficient detail and depth to permit evaluation against the identified criteria may render a Proposal non-responsive. **All Bidders are advised that only listing experience without providing any supporting data to describe where and how such experience was obtained will not be considered to be “demonstrated” for the purpose of the evaluation. All professional experience should be fully demonstrated in the Proposal (i.e., dates, number of years and months of experience).**
- 1.8 The Bidders acknowledge and agree that Canada is not responsible to search for, and therefore evaluate, information that is not properly referenced or is not otherwise provided in accordance with the Proposal Preparation Instructions in Part 2, Article 3.0.
- 1.9 Bidders shall not place any conditions or make any assumptions that attempt to limit or otherwise modify the scope of Work pursuant to the Statement of Work (Appendix B).
- 1.10 In the event two or more responsive proposals receive the same combined score, the proposal with the highest technical score will be ranked higher.

Refer to Attachment #1 to Appendix D for the Mandatory Criteria.

3.0 POINT RATED REQUIREMENTS

The Bidder should address the rated requirements in the order in which they are listed and in sufficient detail so that an in-depth evaluation is possible. These criteria will be used by Agriculture and Agri-Food Canada to evaluate each Proposal. The assessment by AAFC will be based solely on the information contained in the Proposal. An item not addressed will be given zero (0) points under the point rated system. AAFC may, but is not obligated to, ask the Bidder for clarifications.

The Bidder is requested to use the tables provided to identify where the information can be found in the proposal (i.e.: Identify the page / project number, etc.)

Refer to Attachment #2 to Appendix D for the Point Rated Criteria.

4.0 FINANCIAL PROPOSAL

- 4.1 In the Financial Proposal, the Bidder shall provide a firm, all inclusive price to provide the services requested in accordance with the Statement of Work **Appendix B.**

5.0 DETERMINATION OF SUCCESSFUL BIDDER

The Bidders will be ranked according to the combined financial and technical score. The Bidder with the (highest combined score will be awarded the contract).

CERTIFICATION REQUIREMENTS

APPENDIX E

The following certification requirements apply to this RFP document. Bidders should include, with their proposal, a signed copy of the certifications below.

A) LEGAL ENTITY AND CORPORATE NAME

Please certify that the Bidder is a legal entity that can be bound by the contract and sued in court and indicate **i)** whether the Bidder is a corporation, partnership or sole proprietorship, **ii)** the laws under which the Bidder was registered or formed, **iii)** together with the registered or corporate name. Also identify **iv)** the country where the controlling interest/ownership (name if applicable) of the Bidder is located.

- i) _____
- ii) _____
- iii) _____
- iv) _____

Any resulting Contract may be executed under the following **i)** corporate full legal name and **ii)** at the following place of business (complete address) **iii)** telephone and fax number and email:

- i) _____
- ii) _____
- iii) _____

Name

Signature

Date

B) EDUCATION/EXPERIENCE CERTIFICATION

We certify that all statements made with regard to the education and the experience of individuals proposed for completing the subject Work are accurate and factual, and we are aware that the Minister reserves the right to verify any information provided in this regard and that untrue statements may result in the proposal being declared **non-responsive** or in other action which the Minister may consider appropriate.

Signature

Date

C) PRICE / RATE CERTIFICATION

"We hereby certify that the price quoted have been computed in accordance with generally accepted accounting principles applicable to all like services rendered and sold by us, that such prices are not in excess of the lowest prices charged anyone else, including our most favoured customer for like quality and quantity so the services, does not include an element of profit on the sale in excess of that normally obtained by us on the sale of services of like quality and quantity, and does not include any provision for discounts or commissions to selling agents".

Signature

Date

D) VALIDITY OF PROPOSAL

It is requested that proposals submitted in response to this Request for Proposal be:

- valid in all aspects, including price, for not less than one hundred and twenty (120) days from the closing date of this RFP; and,
- signed by an authorized representative of the Bidder in the space provided on the RFP; and,
- provide the name and telephone number of a representative who may be contacted for clarification or other matters relating to the Bidder's proposal.

Signature

Date

Contact name: _____

Telephone number: _____

Fax number: _____

Email address: _____

GST # / Business #: _____

E) AVAILABILITY AND STATUS OF PERSONNEL

The Bidder certifies that, should it be authorized to provide services under any contract resulting from this RFP, the employees proposed in its proposal will be available to commence performance of the work within a reasonable time from contract award, or within the time specified herein.

If the Bidder has proposed any person in fulfilment of this requirement who is not an employee of the Bidder, the Bidder hereby certifies that it has written permission from such person to propose the services of such person in relation to the work to be performed in fulfilment of this requirement and to submit such person's résumé to the Contracting Authority.

During the proposal evaluation, the Bidder MUST upon the request of the Contracting Authority, provide a copy of such written permission, in relation to any or all non-employees proposed. The Bidder agrees that failure to comply with such a request may lead to disqualification of the Bidder's proposal from further consideration.

Signature

Date

F) FORMER PUBLIC SERVANT (FPS) - STATUS AND DISLCOSURE

Contracts with Former Public Servants in receipt of a pension or of a lump sum payment must bear the closest public scrutiny, and reflect fairness in the spending of public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, bidders must provide the information required below.

Definitions

For the purposes of this clause:

"former public servant" is any former member of a department as defined in the Financial Administration Act, R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- a. an individual;
- b. an individual who has incorporated;
- c. a partnership made of former public servants; or
- d. a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the size of the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means, a pension or annual allowance paid under the Public Service Superannuation Act (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the Supplementary Retirement Benefits Act, R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the Canadian Forces Superannuation Act, R.S., 1985, c.C-17, the Defence Services Pension Continuation Act, 1970, c.D-3, the Royal Canadian Mounted Police Pension Continuation Act, 1970, c.R-10, and the Royal Canadian Mounted Police Superannuation Act, R.S., 1985, c.R-11, the Members of Parliament Retiring Allowances Act, R.S., 1985, c.M-5, and that portion of pension payable to the Canada Pension Plan Act, R.S., 1985, c.C-8.

Former Public Servant in Receipt of a Pension

As per the above definitions, is the Bidder a FPS in receipt of a pension ?

Yes () No ()

If so, the Bidder must provide the following information, for all FPS in receipt of a pension, as applicable:

- a. name of former public servant;
- b. date of termination of employment or retirement from the Public Service.

By providing this information, Bidders agree that the successful Bidder's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure report.

Work Force Reduction Program

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of a work force reduction program ?

Yes () No ()

If so, the Bidder must provide the following information:

- a. name of former public servant;
- b. conditions of the lump sum payment incentive;
- c. date of termination of employment;
- d. amount of lump sum payment;
- e. rate of pay on which lump sum payment is based;

- f. period of lump sum payment including start date, end date and number of weeks;
- g. number and amount (professional fees) of other contracts subject to the restrictions of a work force reduction program.

For all contracts awarded during the lump sum payment period, the total amount of fees that may be paid to a FPS who received a lump sum payment is \$5,000, including the Goods and Services Tax or Harmonized Sales Tax.

Signature

Date

G) JOINT VENTURES

In the event of a Proposal submitted by a contractual JOINT VENTURE, the Proposal shall be signed by either all members of the joint venture or a statement shall be provided to the effect that the signatory represents all parties of the joint venture. The following will be completed if applicable:

The Proposer represents that the bidding entity (**mark applicable choice**)

1. _____ is a joint venture in accordance with the definition in paragraph 3.

_____ is not a joint venture in accordance with the definition in paragraph 3.

2. A Proposer that is a joint venture represents the following additional information:

(a) Type of joint venture (**if applicable, mark applicable choice**)

- _____ incorporated joint venture
- _____ limited partnership joint venture
- _____ partnership joint venture
- _____ contractual joint venture
- _____ other

(b) Composition: (names and addresses of all members of the joint venture.)

3. Definition of Joint Venture

A joint venture is an association of two or more parties who combine their money, property, knowledge, skills, time or other resources in a joint business enterprise agreeing to share the profits and the losses and each having some degree of control over the enterprise. Joint ventures may be carried on in a variety of legal forms divided into three categories:

- (a) the incorporated joint venture;
- (b) the partnership venture;

- (c) the contractual joint venture where the parties combine their resources in the furtherance of a single business enterprise without actual partnership or corporate designation
4. The joint venture team arrangement is to be distinguished from other types of contractor arrangements, such as:
- (a) prime contractor, in which, for example, the purchasing agency contracts directly with a contractor (prime) who acts as the system assembler and integrator, with major components, assemblies and subsystems normally subcontracted;
 - (b) associated contractor, in which for example, the purchasing agency contracts directly with each of the major component suppliers and performs the integration tasks or awards a separate contract for this purpose.
5. If the Contract is awarded to an unincorporated joint venture, all members of the joint venture shall be jointly and severally responsible for the performance of the Contract.

Signature

Date

H) FEDERAL CONTRACTORS PROGRAM

Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list (http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml) available from Human Resources and Skills Development Canada - Labour's website.

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award.

Signature

Date

D) INTEGRITY PROVISIONS

1. Ineligibility and Suspension Policy (the “Policy”), and all related Directives (2016-04-04), are incorporated by reference into, and form a binding part of the procurement process. The Supplier must comply with the Policy and Directives, which can be found at [Ineligibility and Suspension Policy](#).
2. Under the Policy, charges and convictions of certain offences against a Supplier, its affiliates or first tier subcontractors, and other circumstances, will or may result in a determination by Public Works and Government Services Canada (PWGSC) that the Supplier is ineligible to enter, or is suspended from entering into a contract with Canada. The list of ineligible and suspended Suppliers is contained in PWGSC’s Integrity Database. The Policy describes how enquiries can be made regarding the ineligibility or suspension of Suppliers.
3. In addition to all other information required in the procurement process, the Supplier must provide the following:
 - a. by the time stated in the Policy, all information required by the Policy described under the heading “Information to be Provided when Bidding, Contracting or Entering into a Real Property Agreement”; and
 - b. with its bid / quote / proposal, a complete list of all foreign criminal charges and convictions pertaining to itself, its affiliates and its proposed first tier subcontractors that, to the best of its knowledge and belief, may be similar to one of the listed offences in the Policy. The list of foreign criminal charges and convictions must be submitted using an Integrity Declaration Form, which can be found at [Declaration form for procurement](#).
4. Subject to subsection 5, by submitting a bid / quote / proposal in response a request by AAFC, the Supplier certifies that:
 - a. it has read and understands the [Ineligibility and Suspension Policy](#);
 - b. it understands that certain domestic and foreign criminal charges and convictions, and other circumstances, as described in the Policy, will or may result in a determination of ineligibility or suspension under the Policy;
 - c. it is aware that Canada may request additional information, certifications, and validations from the Supplier or a third party for purposes of making a determination of ineligibility or suspension;
 - d. it has provided with its bid / quote / proposal a complete list of all foreign criminal charges and convictions pertaining to itself, its affiliates and its proposed first tier subcontractors that, to the best of its knowledge and belief, may be similar to one of the listed offences in the Policy;
 - e. none of the domestic criminal offences, and other circumstances, described in the Policy that will or may result in a determination of ineligibility or suspension, apply to it, its affiliates and its proposed first tier subcontractors; and
 - f. it is not aware of a determination of ineligibility or suspension issued by PWGSC that applies to it.

5. Where a Supplier is unable to provide any of the certifications required by subsection 4, it must submit with its bid/ quote / proposal a completed Integrity Declaration Form, which can be found at [Declaration form for procurement.](#)
6. Canada will declare non-responsive any bid / quote / proposal in respect of which the information requested is incomplete or inaccurate, or in respect of which the information contained in a certification or declaration is found by Canada to be false or misleading in any respect. If Canada establishes after award of the Contract that the Supplier provided a false or misleading certification or declaration, Canada may terminate the Contract for default. Pursuant to the Policy, Canada may also determine the Supplier to be ineligible for award of a contract for providing a false or misleading certification or declaration.

LIST OF NAMES:

Bidders who are a '**sole proprietorship**' must provide the name of the owner(s).

Bidders who are '**incorporated**' must provide:

- a) a complete list of all persons who are owners OR
- b) a list of all individuals who are on the current Board of Directors

Bidders who are a '**joint venture**' must provide a complete list of Company names under the Joint venture with:

- a) a complete list of all owners for each company OR
- b) a complete list all individuals who are on the current Board of Directors for each company

Bidders who are a '**society**' or '**partnerships**' do not need to provide names.

CERTIFICATION:

I _____ (Suppliers name) understand that any information I submit in order for the department to confirm my eligibility to receive a contract may be shared and used by AAFC and /or PSPC as part of the validation process, and the results of verification may be publicly disseminated. Moreover, I am aware that any erroneous or missing information could result in the cancellation of my bid as well as a determination of ineligibility/suspension.

Name

Signature

Date

Attachment #1 to Appendix D - Mandatory Criteria

Bidder is requested to use the tables provided below to identify where the information can be found in the proposal (i.e.: Identify the page / project number, etc.)

Proposals will be evaluated in accordance with the mandatory evaluation criteria as detailed herein. Bidders' Proposals must clearly demonstrate that they meet all Mandatory Requirements for the proposal to be considered for further evaluation.

Failure to comply with any of the mandatory requirements will render the Proposal non-compliant and the Proposal will receive no further consideration.

No.	Mandatory Criteria	Criteria met (Yes or No)	Reference (Page of bid confirming that the criteria has been met)
M1	<p>Qualifications and experience of the firm</p> <p>Bidder (the company) must demonstrate at least 10 years of experience in the field of potable water quality, including interpreting the requirements of Canada Labour Code, National plumbing code, federal and provincial guidelines, legislations and regulations with respect to potable water and potable water systems. The bidder must demonstrate the ability to do work (similar type, scale and scope).</p>		
M2	<p>Qualifications of the project team</p> <p>The project team must include: One (1) professional Engineer with at least 10 years of experience in potable water quality and potable water treatment systems.</p> <p>Curriculum vitae (CV) and copy of professional engineering certificate must be provided with the bid.</p>		
M3	<p>Clients reference contact information</p> <p>Bidder must provide 2 different past clients for which the bidder has been contracted within the past 5 years. AAFC may contact the reference(s) to verify information.</p>		

Attachment #2 to Appendix D - Point Rated Criteria

The Bidder should address the rated requirements in the order in which they are listed and in sufficient detail so that an in-depth evaluation is possible. These criteria will be used by Agriculture and Agri-Food Canada to evaluate each Proposal. The assessment by AAFC will be based solely on the information contained in the Proposal. An item not addressed will be given zero (0) points under the point rated system. AAFC may, but is not obligated to, ask the Bidder for clarifications.

The Bidder is requested to use the tables provided below to identify where the information can be found in the proposal (i.e.: Identify the page / project number, etc.)

No.	Point-rated criteria	Max. Points	Min. Points	Points Awarded	Reference (Page of bid confirming that the criteria has been met)
R1	<p>Understanding of the Project</p> <p>Bidder must demonstrate in the proposal of their understanding of the project through analysis of project goals, tasks and requirements, definition of special issues and/or constraints, breakdown of tasks and required resource allocations.</p> <p>Maximum of 2 pages.</p>	20	10		
R2	<p>Methodology, Approach and Timeline</p> <p>Bidder must demonstrate in the proposal the approach, methodology, work plan and timelines for development of Phase I (the work) and Phase II (optional work). Consideration should be given for creating efficiencies for template population, data collection and site specific plan development.</p> <p>Maximum of 10 pages.</p>	50	30		
R3	<p>Experience in Potable Water Treatment Systems and Potable Water Building Distribution Systems</p> <p>Curriculum vitae (CV) for all project members stating the individual's work experience and a description of previous projects related to the</p>	30	15		

potable water quality treatment systems and potable water building distribution systems. (Micro scale potable water treatment experience and or/working with Federal water systems an asset)				
Maximum of 3 pages per Curriculum vitae (CV).				
Maximum points for technical rated criteria:	100			
Your Score:				

RATINGS SCALE:

Point Rated Criteria	Weight Factor	Rating	Weighted Rating
Understanding of the Project	2.0	0-10	0-20
Methodology, Approach and Timeline	5.0	0-10	0-50
Experience in Potable Water Treatment Systems and Potable Water Building Distribution Systems	3.0	0-10	0-30
TOTAL			0-100

Generic Evaluation Table

AAFC Evaluation Team members will evaluate the strengths and weaknesses of the Bidder’s response to the evaluation criteria and will rate each criterion with even numbers (0, 2, 4, 6, 8 or 10) using the generic evaluation table below:

	Inadequate	Weak	Adequate	Fully Satisfactory	Strong
0 points	2 points	4 points	6 points	8 points	10 points
Did not submit information which could be evaluated	Lacks complete or almost complete understanding of the requirements	Has some understanding of the requirements but lacks adequate understanding in some areas of the requirements.	Demonstrates a good understanding of the requirements.	Demonstrates a very good understanding of the requirements.	Demonstrates an excellent understanding of the requirements.
	Weaknesses cannot be corrected	Generally doubtful that weaknesses can be corrected	Weaknesses can be corrected	No significant weaknesses	No apparent weaknesses

	Bidder does not possess qualifications and experience	Bidder lacks qualifications and experience	Bidder has an acceptable level of qualifications and experience	Bidder is qualified and experienced	Bidder is highly qualified and experienced
	Team proposed is not likely able to meet requirements	Team does not cover all components or overall experience is weak	Team covers most components and will likely meet requirements	Team covers all components - some members have worked successfully together	Strong team - has worked successfully together on comparable projects
	Sample projects not related to this requirement	Sample projects generally not related to this requirement	Sample projects generally related to this requirement	Sample projects directly related to this requirement	Leads in sample projects directly related to this requirement
	insufficient to meet performance requirements	Little capability to meet performance requirements	Acceptable capability should ensure adequate results	Satisfactory capability, should ensure effective results	Superior capability should ensure every effective results

Appendix I AAFC Potable Water Quality Guidelines and Standards

**POTABLE WATER GUIDELINES AND STANDARDS
FOR AGRICULTURE AND AGRI-FOOD CANADA**

Agriculture and Agri-Food Canada

Revised DRAFT VERSION

May 2007

(With revisions August 2007)

EXECUTIVE SUMMARY

Potable Water Guidelines and Standards for Agriculture and Agri-Food Canada (AAFC) are designed to meet the specific needs of AAFC water supply systems. The Potable Water Guidelines and Standards for AAFC provide water quality reporting tools and an approach to due diligence through detailed, clear and consistent requirements that ensure the provision of safe drinking water.

The Potable Water Guidelines and Standards in this document represent the minimum requirements to provide safe potable water to consumers. The tools in the appendices provide a common approach to assist a water system operator with a documentation framework to ensure due diligence and delivery of potable water. Potable water treatment systems should be designed, constructed, operated and upgraded (as required) to provide safe drinking water given the source water characteristics. Operators of AAFC potable water systems may change the sampling and testing requirements outside of these Guidelines and Standards depending on site specific conditions and in consultation with the AAFC Water Quality Aspect Lead.

The Potable Water Guidelines and Standards take into consideration the unique characteristics of AAFC systems and are designed to be practical, so they are easy to understand and implement by operational staff. The AAFC Potable Water Guidelines and Standards are based on the principles outlined in the Guidance for providing safe drinking water in areas of federal jurisdiction, published by Health Canada (2005).

Major points incorporated in the AAFC Potable Water Guidelines and Standards include:

- clear and concise definition of system sizes;
- treatment requirements based on the characterization of the raw water source;
- updated sampling and testing requirements of microbiological and chemical parameters;
- reduced requirements for disinfection/treatment of groundwater systems that demonstrate good water quality;
- sanitary surveys to identify potential threats to either the source of drinking water or to the treatment process; and
- operational checks (chlorine residual and turbidity monitoring) that minimize operating costs and enhance the provision of safe water.

In addition to the Potable Water Guidelines and Standards which assist in the delivery of safe water for drinking, personal washing and food preparation, included is information for water conservation, sampling methods, and source protection. Detailed information is available through the Water Quality Aspect Lead.

Annual review and updating of the Potable Water Guidelines and Standards will be conducted by the AAFC Water Quality Aspect Lead.

Table 1.0 provides a summary of the AAFC Potable Water Guidelines and Standards and provides a quick reference guide to system operators relating to the required testing frequencies and conditions. For detailed information refer to the appropriate sections of this document.

TABLE 1.0
AAFC POTABLE WATER SYSTEMS – GUIDELINES & STANDARDS

System Size and Approx Number of People	MICRO			VERY SMALL			SMALL			MEDIUM		
	(<1,200 L/day) (<10 people)			(1,200-6,000 L/day) (10 - 50 people)			(6,000 - 60,000 L/day) (50-500 people)			(>60,000 L/day) (>500 people)		
	129 systems or 72%			29 systems or 16%			20 systems or 11%			1 system or 1%		
Water Source	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal
Disinfection												
Treatment Plant	Primary Disinfection (i.e. chlorination or UV) & Filtration	Primary Disinfection (i.e. chlorination or UV)	As required	Primary Disinfection (i.e. chlorination or UV) & Filtration	Primary Disinfection (i.e. chlorination or UV)	As required	Primary Disinfection (i.e. chlorination or UV) & Filtration	Primary Disinfection (i.e. chlorination or UV)	As required	Primary Disinfection (i.e. chlorination or UV) & Filtration	Primary Disinfection (i.e. chlorination or UV)	As required
Distribution System	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine	1.0 mg/L of total chlorine or 0.2 mg/L free chlorine
Chlorine Residual Sampling												
In Treatment Plant	As required for operational purposes	As required for operational purposes	N/A	As required for operational purposes	As required for operational purposes	N/A	Weekly or as required for operational purposes	Weekly or as required for operational purposes	N/A	Continuous or as required for operational purposes	Continuous or as required for operational purposes	N/A
In Distribution System	With Bacteriological sampling	With Bacteriological sampling	With Bacteriological sampling	With Bacteriological sampling	With Bacteriological sampling	With Bacteriological sampling	Weekly and with bacteriological sample	With Bacteriological sampling	With Bacteriological sampling	Daily at strategic locations	Daily at strategic locations	N/A
THM (for chlorinated systems with distribution)	Monthly or after a major weather event	Spring and Fall or after a major weather event	Retrieve results from Supplier every 2 to 5 years	Monthly or after a major weather event	Spring and Fall or after a major weather event	Retrieve results from Supplier every 2 to 5 years	Monthly or after a major weather event	Spring and Fall or after a major weather event	Retrieve results from Supplier every 2 to 5 years	Every 90 days or as determined by Technical Support Person	Every 90 days or as determined by Technical Support Person	Every 90 days or as determined by Technical Support Person

System Size and Approx Number of People	MICRO (<1,200 L/day) (<10 people)			VERY SMALL (1,200-6,000 L/day) (10 - 50 people)			SMALL (6,000 - 60,000 L/day) (50-500 people)			MEDIUM (>60,000 L/day) (>500 people)		
	129 systems or 72%			29 systems or 16%			20 systems or 11%			1 system or 1%		
Water Source	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal
Turbidity Sampling (Before Disinfection)												
	For operational purposes and with bacteriological sample	For operational purposes and at least every three months unless system data indicates frequency can be reduced	N/A	Weekly, for operational purposes and with bacteriological sample	For operational purposes and at least every three months unless system data indicates frequency can be reduced	N/A	Once per day, after a major weather event and with bacteriological sample	Once per day and with Bacteriological sampling	N/A	Continuous or as required for operational purposes	Continuous or as required for operational purposes	N/A
Microbiological Sampling: Treatment System												
<i>Before Treatment Sample (i.e. raw water)</i>	N/A	If present in distribution	N/A	Monthly or after a major weather event	Quarterly	N/A	N/A	One sample/month and after major weather events	N/A	N/A	One sample/month and after major weather events	N/A
<i>Treated Water Sample</i>	Monthly, after a major weather event and after plumbing ¹ work	Spring and Fall or after a major weather event and after plumbing ¹ work	Spring and Fall or after a major weather event and after plumbing ¹ work	Four times monthly and after a major weather event	Quarterly (with high quality water, i.e. no bacteriological problems)	Quarterly	Four samples / month at regular intervals at locations determined by WQ Aspect Lead	Four times monthly at locations determined by WQ Aspect Lead	Monthly at locations determined by WQ Aspect Lead	Four samples / month at regular intervals at locations determined by WQ Aspect Lead	Four samples / month at regular intervals at locations determined by WQ Aspect Lead	Monthly at locations determined by WQ Aspect Lead
<i>Seasonal Systems</i>	Analysis after a period of pumping at the beginning of field season then monthly and after plumbing ¹ work	Analysis after a period of pumping at the beginning of field season and after plumbing ¹ work	Analysis after a period of flushing at the beginning of field season and after plumbing ¹ work	Analysis after a period of pumping at the beginning of field season then monthly	Analysis after a period of pumping at the beginning of field season then quarterly	Analysis after a period of flushing at the beginning of field season then quarterly	Analysis after a period of pumping at the beginning of field season then as above	Analysis after a period of pumping at the beginning of field season then as above	Analysis after a period of flushing at the beginning of field season then as above	N/A	N/A	N/A
<i>Sampling reduction for non seasonal systems with treatment and 24 adverse free operational months</i>	N/A	N/A	N/A	N/A	N/A	N/A	Based on sanitary survey	Based on sanitary survey	Based on sanitary survey	Based on sanitary survey	Based on sanitary survey	N/A
Microbiological Sampling²:												

¹ Plumbing work includes alterations to fixtures and piping, for example installation of a dishwasher, tap replacement, new bathroom installation, etc.

² Refer to definition of distribution system (i.e. at least 500 m of piping)

System Size and Approx Number of People	MICRO (<1,200 L/day) (<10 people)			VERY SMALL (1,200-6,000 L/day) (10 - 50 people)			SMALL (6,000 - 60,000 L/day) (50-500 people)			MEDIUM (>60,000 L/day) (>500 people)		
	129 systems or 72%			29 systems or 16%			20 systems or 11%			1 system or 1%		
Water Source	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal
Distribution System												
At designated points in the distribution system	N/A	N/A	N/A	Four samples per month and after any plumbing or piping work	Four samples per month and after any plumbing or piping work	Four samples per month and after any plumbing or piping work	In consultation with the WQ Aspect Lead	In consultation with the WQ Aspect Lead	In consultation with the WQ Aspect Lead	In consultation with the WQ Aspect Lead	In consultation with the WQ Aspect Lead	In consultation with the WQ Aspect Lead
Chemical Sampling												
<i>Inorganic & Organic Parameters (raw water or after treatment)</i>	Once every 5 years	Once every 5 years	Retrieve treated results from supplier every 5 years	Every 2 years for substances of interest, baseline every 5 years	Every 2 years for substances of interest, baseline every 5 years	Retrieve treated results from supplier every 5 years	Every 2 years for substances of interest, baseline every 5 years	Every 2 years for substances of interest, baseline every 5 years	Retrieve results from supplier every 2 years for substances of interest, baseline every 5 years	Every 2 years for substances of interest, baseline every 5 years	Every 2 years for substances of interest, baseline every 5 years	Retrieve results from supplier every 2 years for substances of interest, baseline every 5 years
<i>Lead (systems with distribution)</i>	As determined by WQ Aspect Lead or as required by Sanitary Survey	As determined by WQ Aspect Lead or as required by Sanitary Survey	Retrieve from supplier every 5 years or as required by Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey	As determined by WQ Aspect Lead or as outlined in Sanitary Survey
<i>Nitrates/Nitrites (in raw water after treatment)</i>	Monthly or after a major weather event	Spring and Fall or after a major weather event	Retrieve from supplier every 5 years	Monthly or after a major weather event	Spring and Fall or after a major weather event	Retrieve from supplier every 5 years	Monthly or after a major weather event	Spring and Fall or after a major weather event	Retrieve from supplier every 5 years	N/A	N/A	N/A
Radionuclide												
<i>Gross alpha, beta activity, Uranium, Lead-210, Radium-226, Radium-228</i>	Once every 5 years	Once every 5 years	Retrieve from supplier every 5 years	Once every 5 years	Once every 5 years	Retrieve from supplier every 5 years	Once every 5 years	Once every 5 years	Retrieve from supplier every 5 years	Once every 3 years	Once every 3 years	Retrieve from supplier

System Size and Approx Number of People	MICRO (<1,200 L/day) (<10 people)			VERY SMALL (1,200-6,000 L/day) (10 - 50 people)			SMALL (6,000 - 60,000 L/day) (50-500 people)			MEDIUM (>60,000 L/day) (>500 people)		
	129 systems or 72%			29 systems or 16%			20 systems or 11%			1 system or 1%		
	Water Source	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground	Municipal	Surface & GUDI	Ground
												every 5 years
Sanitary Survey Frequency	5 years	10 years	10 years	5 years	5 years	10 years	5 years	5 years	5 years	3 years in addition third party ever 10 years	3 years in addition third party ever 10 years	3 years in addition third party ever 10 years
Minimum Water Meter Reading Frequency	Monthly	Monthly	Monthly	Monthly	Monthly	Monthly	Weekly	Weekly	Weekly	Weekly	Weekly	Weekly

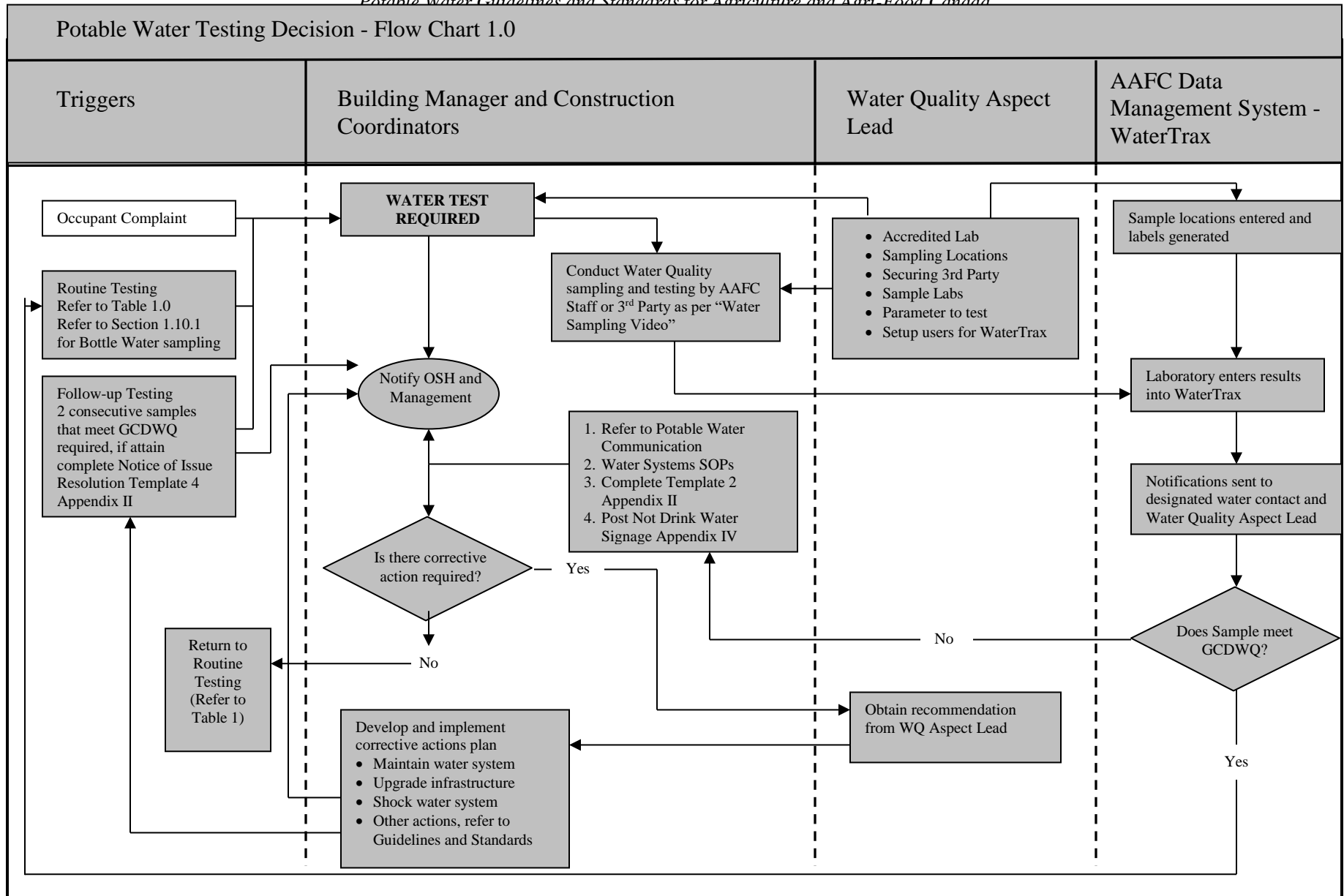


TABLE OF CONTENTS

	<u>Page No.</u>
EXECUTIVE SUMMARY	1
DEFINITIONS.....	11-12
ACRONYMS	14
1.0 POTABLE WATER GUIDELINES AND STANDARDS	15
1.1 Purpose.....	15
1.1.1 Using this Document.....	14
1.1.2 Other Information	15
1.2 Systems Classification	16
1.3 Water Sources	16
1.3.1 Surface Water.....	16
1.3.2 Municipally Supplied Water	16
1.3.3 Systems Receiving Transported (Hauled) Water.....	16
1.3.4 Groundwater	17
1.3.5 Groundwater Under Direction Influence of Surface Water (GUDI)	17
1.4 Principles of Treatment.....	19
1.4.1 Primary Disinfection.....	19
1.4.2 Remote Water Systems	20
1.4.3 Secondary Disinfection.....	20
1.4.4 Disinfection after Construction or Repairs or Seasonal Start-ups	21
1.4.5 Sanitary Survey.....	21
1.5 Reduced Requirements for Disinfection/Treatment	20
1.6 Operational Checks	20
1.6.1 Chlorine Residual.....	20
1.6.2 Turbidity	23
1.6.3 Continuous Monitoring Requirements.....	23
1.7 Microbiological Testing.....	24
1.7.1 Minimum Testing.....	22
1.7.2 Sampling Locations	25
1.7.3 Raw Water Samples	22
1.7.4 Periods of Shutdown	25
1.8 Chemical Testing	25
1.8.1 Initial Characterization.....	25
1.8.2 Sampling Locations – Organic and Inorganic	26
1.8.3 Disinfection By-products	26

1.9	Accredited Laboratories	26
1.10	Systems Receiving Transported (Hauled) Water.....	26
1.10.1	Bottle Water Monitoring.....	24
1.11	Potable Water Supplied (Municipal)	28
1.12	Adverse Results and Corrective Actions	29
1.13	Warning Notices	32
1.14	Notice of Issue Resolution for Boil Water Advisory.....	32
1.15	Annual Report.....	33
1.16	Record Keeping	33
1.17	Operator Certification and Training.....	33
2.0	STANDARD OPERATING PRACTICES (SOP) AND BEST MANAGEMENT PRACTICES (BMP)	35
2.1	SOP for the Collection and Handling of Drinking Water Samples	35
2.1.1	Sampling Location	38
2.1.1.1	Raw Water	38
2.1.1.2	Treated Water.....	38
2.1.1.3	Distribution System Water.....	34
2.1.3	Sample Collection.....	39
2.1.4	Labelling and Data Management	39
2.1.5	Sample Storage and Transportation	39
2.1.6	Chain of Custody	39
2.2	BMP for Water Conservation	40
2.3	BMP for Source Protection.....	40
2.4	Well Abandonment	41
2.5	Cross Connection Control.....	38
2.5.1	Documentation for A Cross Control Program	38
2.5.2	Testing.....	39
2.5.3	Location and Type of Backflow Preventer	39
2.5.3.1	Building Isolation.....	39
2.5.3.2	Zone or Area Protection.....	41
2.5.3.3	Individual Protection.....	41
2.6	Abandoned Water Lines	41
APPENDIX I - TREATMENT REQUIREMENTS		42
Chlorine Disinfection.....		42
Ultraviolet (UV) Disinfection.....		43
Conventional Filtration		44
Direct Filtration.....		44
Slow Sand Filtration		44
Diatomaceous Earth Filtration (DE).....		45

Cartridge/Bag Filters.....	45
Membrane Filtration	46
APPENDIX II - TEMPLATES.....	50
Template 1 - Sanitary Survey and Well System Checklist.....	51
Template 2 - Potable Water Systems Annual Report	59
Template 3 - Report of Adverse Result	64
Template 4 - Notification of Issue Resolution.....	66
Template 5 - Well Decommissioning Records	72
Template 6- Water Service Abandonment Record.....	74
APPENDIX III - Tables for Organic, Inorganic & Radionuclide Parameters and Chemical/Physical Objectives - Not Health Related	73
APPENDIX IV - "Do Not Drink Water" Sign.....	81
APPENDIX V - Micro Systems' Training Module Course (AAFC) (Under Development).....	83
Water Sampling Procedures for Bacteriological Quality.....	84
APPENDIX VI - DECHLORINATION.....	85
APPENDIX VII - CONTRACT EXAMPLE FOR FLUSHING WATER LINES	87
General Instructions	89
Safety Requirements	91
Environmental Protection	92
Cleaning Water Mains (Swabbing).....	93
Asbestos Abatement Minimum Requirements	95
Appendix A.....	96
APPENDIX VIII - EXAMPLE OF RECORD OF CALIBRATION AND REPAIRS	97
APPENDIX IX – INVENTORY OF BACKFLOW PREVENTIONS ASSEMBLY	99
APPENDIX X – BOTTLED WATER DISPENSER MAINTENANCE.....	107
References.....	109

LIST OF TABLES	<u>Page</u>
1.0 AAFC Potable Water Systems - Guidelines and Standards	2 - 5
1.1 Drinking Water Systems Classification	15
1.2 Corrective Actions	27 - 28
2.1 Sampling Requirements for Different Water Quality Parameters	32
AI.1 CT Values for Inactivation of Viruses by Free Chlorine for pH 6-9	43
AI.2 CT Values for Inactivation of Giardia Cysts by Free Chlorine at pH 7 And Temperature of 15° C	44
AI.3 CT Values for Inactivation of Viruses and Giardia Cysts by Zone	44
AI.4 UV Dose required to Achieve Log Inactivation of Viruses, Bacteria and Protozoa	45
AI.5 Maintenance Schedule for UV Disinfection Equipment	46
AI.6 Advantages and Disadvantages of UV Disinfection	46
AI.7 Log Removal Rates of Different Filtration Treatment Technologies	46
AIII.1 Inorganic Parameters	74
AIII.2 Organic Parameters	75 – 77
AIII.3 Radionuclide Parameters	78
AIII.4 Chemical/Physical Objectives – Not Health Related	79 - 80
AVI.1 Dechlorination Agents, Forms and Doses	86

LIST OF FLOW CHARTS	<u>Page</u>
1.0 Potable Water Testing Decision	6

LIST OF FIGURES	<u>Page</u>
Figure 1 Example of Decommissioned Large Diameter Well	37
Figure 2 Example of Decommissioned Small Diameter Well	37

DEFINITIONS

TERM	DEFINITION
Bedrock Well	A bedrock well is completed in the rock underlying surficial unconsolidated material. Fractured bedrock is still bedrock. Unlike overburden wells, bedrock wells are usually in excess of 30m deep and often in excess of 100m deep.
Boil water advisory (BWA)	A temporary notice to inform users to boil water at a full boil for 1 minute prior to consuming while corrective action(s) is being carried out. This type of notice must be rescinded or the BWA will remain in force.
Boil water notice (BWN)	A permanent notice to inform users to boil water prior to consuming.
Certified Operator	The Association of Boards of Certification certified operator training program provides a structured program to achieve the high level of competency in environmental certification programs and is recognized by Provincial and State authorities.
Chloramination	When chlorine and ammonia are combined, they form new chemical complexes called 'chloramines.' Chloramines are four times more stable than chlorine, and are valued for their residual effect in disinfecting drinking water.
Daily flow rate	Amount of water that is provided by a potable water system to consumers.
Distribution system	A plumbing or piping system that is at least 500m from primary treatment or source to the point of use.
Due diligence	A measure of prudence that is to be expected from, and ordinarily exercised by, a reasonable and prudent person under the particular circumstances.
Effluent	Effluent is an outflowing of water usually associated with waste water outflow.
Filter-to-waste	An operational practice of sending water to a waste stream immediately after filters are backwashed or replaced until a biofilm is re-established in the filter and the filter provides adequate removals; consult manufacturer information or in the case of conventional treatment systems, ensure a qualified operator is present during all backwash operations.
Grab sample	A water sample taken manually or automatically at one particular time and place.
Infiltration Gallery	A sub-surface groundwater collection system, typically shallow in depth, constructed with open-jointed or perforated pipes that discharge collected water into a watertight chamber from which the water is pumped to treatment facilities and into the distribution system. Usually located close to streams or ponds.
Medical Officer of Health	A medical practitioner designated by the province to be responsible for local or regional public health OR a qualified public health professional designated by Health Canada.

TERM	DEFINITION
Microbiological testing	Analysis of a sample for total coliform and Escherichia coli.
Micro-system	A system that has a daily flow of less than 1,200 litres per day for 95% of the operational time.
Operational time	The time during which a system is supplying potable water.
Operator	Staff member responsible for the maintenance, adjustment or safe operation of a potable water system.
Overburden Well	An overburden well is screened in the unconsolidated soil materials (e.g. till, sand and gravel, silts and clay) that lie on top of the bedrock.
Potable water	Water meeting the Guidelines for Canadian Drinking Water Quality (GCDWQ).
Primary disinfection	A process or series of processes intended to remove or inactivate human pathogens such as viruses, bacteria and protozoa in water after extraction of water from its source.
Professional Hydrogeologist/ and Engineer	A member with professional status of an Engineering and Geoscience Professional Association as enacted by provincial legislation.
Sanitary Survey	Sanitary Survey is an investigative onsite review of the water source, supply, treatment and distribution equipment, operation, maintenance and monitoring to identify and evaluate factors associated with drinking water which can pose a risk to health.
Seasonal system	A potable water system that is not in operation for 60 or more consecutive days every year.
Secondary disinfection	A process or series of processes intended to provide and maintain a disinfectant residual in a potable water system's distribution system, and in plumbing connected to the distribution system, for the purposes of: (a) protecting water from microbiological re-contamination, (b) reducing bacterial re-growth, (c) controlling biofilm formation, and (d) serving as an indicator of distribution system integrity. It includes the use of disinfectant residuals from primary disinfection to provide and maintain a disinfectant residual in a potable water system's distribution system for the purposes described in clauses (a) to (d).
Series/parallel	A "series" treatment system allows water flow along one path/pipe. A "parallel" treatment system has two or more paths/pipes for the water to flow.
Shutdown period	A period when no drinking water is delivered to consumers for at least 7 days or when no drinking water is delivered for any period of time due to maintenance or repairs to equipment or systems in direct contact with water supplied (e.g. treatment system, pipes, storage, pumps).
Very Remote Water systems	Non-potable water systems that are under a permanent boil water notice and are not generally accessible (eg. A well and tap in a remote location).

TERM	DEFINITION
Vulnerabilities Assessment	A comprehensive assessment of the vulnerability of the source water in the environment. It includes three elements – Delineation of watersheds, aquifers and their protection areas; Identification of hazards, including contaminants of concern and their sources (where possible to determine); Assessment of susceptibility to contamination and ranking of the hazards.
Water Quality Professional	A person with at least five years of experience in the water quality industry and a minimum of a diploma in this area.

ACRONYMS

ABBREVIATION	PHRASE
ANSI	American National Standards Institute
AMS	Asset Management System
AWWA	American Water Works Association
BWA	Boil water advisory
BWN	Boil water notice
E. Coli	Escherichia coli
EIPMS	Environmental Information Performance and Management System
GUDI	Groundwater Under the Direct Influence of surface water
IDWG	Interim Drinking Water Guidelines
MAC	Maximum Acceptable Concentration
MCL	Maximum Contaminant Limit
NSF	National Sanitation Foundation
NTU	Nephelometric Turbidity Units
AAFC	Agriculture and Agri-Food Canada
PHC	Public Health Consultant
TC	Total Coliforms
TCU	True Colour Units
THM'S	Trihalomethanes
U.S. EPA	United States Environmental Protection
VOC	Volatile Organic Compounds

1.0 POTABLE WATER GUIDELINES AND STANDARDS

1.1 PURPOSE

This document provides practical guidance on the application of the Potable Water Guidelines and Standards for the provision of potable water to Agriculture and Agri-Food Canada facilities. This document has been established to ensure consistency in the application of guidelines and standards across all Agriculture and Agri-Food Canada's potable water systems. It is developed to reflect and meet the needs of AAFC water system operators to meet the Canada Labour Code requirements and is guided by the Interdepartmental Working Group on Drinking Water document, "Guidance for providing safe drinking water in areas of federal jurisdiction", published by Health Canada. The focus of the document is on smaller systems with groundwater sources. Note that provincially certified operators are required for systems sized very small and larger with source waters from surface water or groundwater under the direct influence of surface water. **Changes in common practices for the delivery of potable water will occur therefore it is recommended that users of this document ensure hard copies are renewed on an annual basis.**

The Water Quality Aspect Lead should be consulted for unusual situations, questions and as otherwise indicated in this document.

Providing potable water for the general public is not within the mandate of AAFC. Therefore AAFC facilities should not provide potable water to or for users outside of AAFC controlled properties.

1.1.1 Using this Document

Delivery of safe or potable water can be a complex task requiring a significant input of resources or as easy as turning on a tap. Even so, in cases where there is little effort to provide potable water, there is still a requirement to ensure documentation is maintained on a water system. This is the basis for due diligence and to ensure that potable water is delivered to the user. In the appendices of this document there are a number of forms that will help in the documentation process. AAFC also has a data management system for water quality through a commercial software application called "WaterTrax", and also a data acquisition application associated with the Environmental Information and Performance Management System (EIPMS).

To understand the commitment required to deliver safe potable water, water system operators or supervisors such as Facility Managers or Construction Coordinators (PFRA) should be familiar with the water system for which they are responsible to ensure it is maintained. This means that there is a requirement to know the following:

- Establish a contact with a local water quality analysis lab (the Water Quality Aspect Lead can assist with this)
- Have an inventory of the Point of Entry (POE) and Point of Use (POU) water treatment systems.

- Know the location of pipe and type of pipe materials used in the distribution system.
- Number of people served by the water system
- Average quantity used on a daily basis
- Know the source of the water (i.e. municipal, groundwater etc)
- Know the water sampling frequency

From the information gathered above, water operators can assess the actions required from table 1.0 for the water system they are responsible for. Delivery of safe potable water requires a multi-barrier approach. “Barriers” are put in place to either eliminate contamination or minimize contaminant impact. It may include physical barriers such as source protection and water treatment equipment. Other barriers include documentation, commitment to conducting water quality monitoring, and other management practices related to accepted practices for the delivery of potable water.

1.1.2 Other Information

Companion information that is referred to with this document:

- 1) Potable Water Sampling Video – This is a training video in DVD, CD and internet format that demonstrates the basic requirements for water quality sampling and the sampling protocols for total coliform, E.coli, metals and other constituents. This training video is available through the Water Quality Aspect Lead.
- 2) Standard Operating Procedure for Water System Operators to issue the following advisories:
 - Boil Water
 - Non-potable water advisory
 - Provision for alternate source of potable water
 - System flushing advisory
- 3) Potable Water Systems Communication Protocol
- 4) The guideline complements the [*Guidance For Providing Safe Drinking Water in Areas of Federal Jurisdiction - Version 1 \(August, 2005\)*](#)
- 5) The [Guidelines for Canadian Drinking Water Quality](#)

Contact the Water Quality Aspect Lead in Engineering and Environmental Services, Asset Team, for more details.

1.2 SYSTEMS CLASSIFICATION

In order to design the requirements for AAFC systems, the following classifications have been used. See Table 1.1. These classifications are appropriate for the sizes of AAFC systems.

TABLE 1.1
1.1. DRINKING WATER SYSTEMS CLASSIFICATION

Classification	Daily Flow Rate
Micro-systems	<1,200 L/day for 95% of the operational time
Very Small systems	1,200-6,000 L/day for 95% of the operational time
Small systems	6,000-60,000 L/day for 95% of the operational time
Medium systems	>60,000 L/day for 95% of the operational time

The **flow rate governs the classification**. If the system classification changes during the year or if no flowrate range identified above applies for 95% of the operational time, the **larger predominant flow rate** shall govern the classification of the system. For example, during summer peak months, a system may be considered medium whereas during the winter it could be considered small or very small due to the decrease in flow rate; in this case, the system would be classified as medium.

These flow rates are based on 120 litres per person per day which is equivalent to the following daily populations:

Micro-systems: <10 people
 Very Small systems: 10-50 people
 Small systems: 50-500 people
 Medium systems: >500 people

Note: AAFC water systems are classified based on daily flow rates; number of persons is shown for information only.

It is important to ensure that all potable water systems have a water meter installed at a location that will measure all potable water consumption and that regular reading and recording of water usage (refer to Table 1.0) be undertaken. Frequent meter readings may be required for a period of time or seasonally to determine daily flow rates if these are not known.

At some facilities livestock and irrigation watering impacts the quantity of water used. In these cases it is still important to ensure that water delivered for human consumption meets the requirements outlined in the AAFC Potable Water Guidelines and Standard. This document is intended to address water quality for human use only and will not address water quality for livestock and irrigation watering.

1.3 Water Sources

AAFC has a number of water systems which are owned and operated by departmental representatives. These water systems range in size and complexity and require different approaches to ensure potable drinking water. The following outlines the different sources and challenges.

1.3.1 Surface Water

Surface water is all water naturally open to the atmosphere (rivers, lakes, reservoirs, ponds, streams, impoundments, seas, estuaries, etc.) These water sources are open to contamination from hydrogeologic conditions that may permit pathogens such as giardia lamblia (a pathogenic organism) or other contaminants from rainfall or surface runoff to contaminate the water source.

1.3.2 Groundwater

Groundwater is defined as sub-surface water that fills openings and pore spaces in soil and rock layers. The formations that hold this groundwater are known as aquifers. Aquifers are water bearing layers (or formations) typically comprised of sand, gravel, or sandstone. These materials have large enough pore spaces between grains that water moves freely. Groundwater wells are constructed to draw this water into a well through slots in the casing, a well screen or simply through the bottom of the well casing (such as in the case of fractured rock).

1.3.3 Groundwater Under Direct Influence of Surface Water (GUDI)

Groundwater under the Direct Influence of Surface Water (GUDI) specifically refers to those groundwater sources where local hydrogeologic conditions may permit pathogens such as giardia lamblia (a pathogenic organism) to travel from nearby surface water sources into the groundwater source. The following systems are deemed to be supplied by GUDI source(s), unless a professional engineer or professional hydrogeologist concludes that the raw water supply is not GUDI:

1. A drinking water system that obtains water from a well that is not a drilled well.
2. A well that does not have watertight casing for the top six metres of the well.
3. A drinking water system that obtains water from an infiltration gallery.
4. A drinking water system that exhibits evidence of contamination by surface water during routine sampling or a sanitary survey (i.e., algae presence –measured as Chlorophyll a- or high nitrate levels).
5. A micro, very small or small potable water system that obtains water from a well, any part of which is within 15 metres of surface water.
6. A medium or large potable water system that obtains water from an overburden well, any part of which is within 100 metres of surface water.
7. A medium or large potable water system that obtains water from a bedrock well, any part of which is within 500 metres of surface water.

1.3.4 Municipally Supplied Water

Municipal water is water supplied through a network of pipes, pumps, and storage and treatment facilities designed to deliver potable water to homes, schools, businesses, and

other users in a city, town or a municipal district. The ultimate source of municipally supplied water may be surface water, groundwater or GUDI.

1.3.5 Systems Receiving Transported (Hauled) Water

Hauled water is water that is delivered to the site by a company or individual that uses a tank designed and maintained for potable water system, to transport water from a potable source to a facility with a holding vessel designed and maintained for potable water. Again, the ultimate source of hauled water is surface water, groundwater or GUDI.

1.3.5.1 Bottled Water

Bottled water is water which has been extracted from its natural source, possibly treated, and packaged in sealed containers for human consumption. Bottled water may be provided to staff at the discretion of management to address concerns over aesthetics of the water (temperature, smell, etc.) or on a temporary basis when the water system is delivering water which is deemed unfit for consumption. Bottled water shall never be used to replace water that is unfit for consumption on a continuous basis (i.e. it does not replace the responsibility of management to sure the requirements are met to provide potable water for staff as outlined within the Canada Labour Code). If it is determined that the water supply is contaminated and bottled water is required, AAFC's Potable Water Systems Communication Protocol shall be followed.

1.4 PRINCIPLES OF TREATMENT

1.4.1 Primary Disinfection

Primary disinfection and filtration for surface water and GUDI raw water supply:

Ensure the provision of water treatment equipment that is designed to be capable of achieving, at all times, primary disinfection of at least 99 percent removal or inactivation of bacteria, at least 99.9 percent removal or inactivation of Giardia cysts, Cryptosporidium oocysts and viruses by the time water enters the distribution system. Conditions to achieve these removal rates for different types of treatment technologies are outlined in Appendix I.

Primary disinfection for groundwater raw water supply:

Ensure the provision of water treatment equipment that is designed to be capable of achieving, at all times, primary disinfection for removal or inactivation of pathogens (i.e. at least 99 percent for bacteria and viruses) by the time the water enters the distribution system. For example, with groundwater of pH 7-8 and temperature 7-10 degrees Celsius (°C), this requirement for viruses can be met by maintaining a minimum chlorine residual of 0.2 mg/L, measured as free chlorine, after 15 minutes of contact time. Primary disinfection can also be conducted using Ultraviolet disinfection system with a 5 micron prefiltration system if turbidity is within manufacturers guidelines (refer to Appendix I

for discussion on different treatment technologies). Note that contact time is a primary consideration in the design of water treatment systems; refer to the system manual or contact the Water Quality Aspect Lead for the contact times required for individual systems to adequately treat pathogens.

1.4.2 Remote Water Systems

For very remote stand alone water systems without treatment, a “Do Not Drink Water” sign must be posted. A permanent boil water notice (BWN) may be posted for all very remote systems if no adverse chemical results are found after chemical characterization of parameters in Appendix III, Tables 1, 2 and 3, is completed.

1.4.3 Secondary Disinfection

Secondary disinfection refers to the residual disinfection effect in the distribution system and is provided through the use of chlorine or chloramines as a disinfectant. The maintenance of a disinfectant residual in the distribution system (secondary disinfection) is intended to maintain (or introduce and maintain) a persistent disinfectant residual to protect the water from microbiological re-contamination, reduce bacterial re-growth, control biofilm formation, and serve as an indicator of the distribution system’s integrity. Loss of disinfectant residual indicating that the system integrity has been compromised can result from a pipe break or from poor circulation or stagnant water in the distribution system, for example. The potable water system’s distribution must be operated in such a manner that at all times and at all locations within the distribution system, there is at least 1.0 mg/L of total chlorine or 0.2 mg/L free chlorine when measured at a pH of at least 6.5.

The maximum chlorine residual at any time and at any location within the distribution system should not exceed 4.0 mg/L when measured as free chlorine, or 3.0 mg/L when measured as combined chlorine.

The quality of treated water must be maintained at all points in the distribution system. Diligence is required on the part of the water system operator to ensure that safe disinfected drinking water arrives at all points throughout the distribution system.

In some water systems with a large distribution system, maintenance of the minimum required residual may not be possible without the operation of re-chlorination facilities at one or more points within the distribution system. Rapid decay of the disinfectant residual may occur as a result of a number of other causes such as heavy encrustation or sediment accumulation and biofilm activity and may require investigation and specific corrective action, such as engineered flow velocity increases, swabbing or pigging/lining and/or main replacement (refer to Appendix VII for an example contract).

1.4.4 Disinfection after Construction or Repairs or Seasonal Start-ups

All parts of potable water systems in contact with drinking water which are taken out of service for inspection, repair or other activities that may lead to contamination before they are put back in service, must be disinfected in accordance with appropriate standards prior to reinstatement to ensure the safety of drinking water that is delivered to consumers. For watermain repairs and maintenance, the provisions of the AWWA Standard for Disinfecting Water Mains C651 (http://www.epa.gov/safewater/disinfection/tcr/pdfs/whitepaper_tcr_watermains.pdf) or an equivalent procedure that ensures would apply (refer to Appendix VI and VII for detailed procedure and contract example). Other AWWA standards that may apply include Disinfection of Wells (C654), Disinfection of Water Storage Facilities (C652) and Disinfection of Water Treatment Plants (C653).

Operators of micro and very small systems should ensure plumbing lines are flushed sufficiently after construction or plumbing³ works and repairs to ensure any contamination sources are flushed from all parts of the system. Appropriate water sampling and testing should be undertaken following construction, repairs, seasonal start-ups.

1.4.5 Other Treatment Processes

Other water treatment processes required will depend on many factors, the most important of which is impurities present in the raw water. The two most common additional processes found in water treatment systems are: softening processes to address excess hardness caused by calcium and magnesium; and, iron and manganese control processes to remove these substances, which can cause undesirable colour, staining and growth of iron bacteria. In all cases, manufacturer specifications and supplier instructions should be followed to ensure the treatment equipment and filter media are operating effectively and remain in good condition. The manufacturer and/or supplier requirements to backwash filters and to regenerate and replace filter media should be reviewed and understood by the system operator.

1.4.6 Sanitary Survey

Sanitary surveys are required to update the information available on the water source and to check the integrity of the potable water system to ensure the provision of safe drinking water. These surveys must be conducted by a certified operator, water quality professional, professional engineer, or hydrogeologist. Sanitary surveys may highlight increased requirements for management, treatment, sampling and testing. To ensure proper operation, a sanitary survey must be carried out for each system as outlined in

³ Plumbing work includes alterations to fixtures and piping, for example installation of a dishwasher, tap replacement, new bathroom installation, etc.

Appendix II Template 1. Sanitary surveys need to be completed for all water systems except very remote systems as per definition.

The initial sanitary surveys will be completed over a phased period, with all systems to be completed by 2009. The frequency of the sanitary surveys outlined in Table 1.0 represents the minimum frequency provided the potable water system does not change significantly. If there are significant land use changes or system changes, a sanitary survey should be conducted within 3-6 months of the changes.

1.5 Reduced Requirements for Disinfection/Treatment

Reduced requirements for disinfection and/or treatment for primary disinfection and treatment may apply to a groundwater system, not under the influence of surface water, in consultation with the AAFC Water Quality Aspect Lead **only** if certain conditions are met:

- History of safe source water (more than 36 operational months of no adverse results in microbiological or chemical tests),
- Regular on-site inspection of the well and wellhead protection, and
- An assessment by a qualified Well Technician that satisfies the specified conditions related to the construction and condition of the well and ensures the integrity of the well.

If reduced requirements for treatment are granted for a groundwater system, a sanitary survey (see Appendix II, Template 1) must be carried out every 3 years regardless of the system size. It should be pointed out those groundwater systems that have been granted reduced requirements from disinfection and have distribution systems **are still required to practice secondary disinfection**.

For newly constructed wells that are not GUDI wells, to obtain reduced requirements for disinfection, they need to be monitored regularly for 12 operational months and either:

- a) supply treated water, and if no adverse results occur, reduced requirements for disinfection is granted, subject to regular on-site inspection of the well and wellhead protection; or
- b) supply untreated water under a BWA while monitoring the system, if no adverse results occur rescind the BWA and obtain granted reduced requirements for disinfection (refer to SOPs Potable Water Systems Communication Protocol), subject to regular on-site inspection of the well and wellhead protection.

Another type of system that receives granted reduced requirements for disinfection is that of very remote water systems which are under permanent “Do Not Drink Water” or BWN sign. These systems are exempt from the guidelines because of their remote location. A permanent “Do Not Drink Water” or BWN sign must be posted visibly to all the water users (for signage, refer to appendix IV).

No reduced requirements for disinfection and/or treatment for primary disinfection and treatment will apply to groundwater under direct influence of surface water or to surface water source systems.

1.6 Operational Checks

1.6.1 Chlorine Residual

Chlorine testing equipment must be calibrated as per the manufacturer's recommendations. All users shall include a record of equipment repairs and equipment calibration in a log (refer to Appendix VIII for an example).

Primary disinfection:

Chlorine residual should be measured in a location that is after the injection and contact point and at the longest point of residence in the primary disinfection system. Testing frequency as per Table 1.0.

Chlorine residual in the distribution system (where primary disinfection is used to also provide distribution system protection) should be measured as set out in Table 1.0. The number of sample points will depend on the size of the distribution system, the number of people served, and historic problem areas (such as stagnant lines). In addition to regular chlorine residual sampling, regular microbiological sampling should also be accompanied by a chlorine residual test. Microbiological samples should be collected from locations different than the normal chlorine sampling points. The purpose is to cover as many different sampling locations as possible (refer to Table 1.0).

Secondary disinfection:

Chlorine residual in the distribution system should be measured as set out in Table 1.0. The number of sample points will depend on the size of the distribution system, the number of people served, and historic problem areas (such as stagnant lines).

In addition to regular chlorine residual sampling, regular microbiological sampling should also be accompanied by a chlorine residual test. Microbiological samples should be collected from locations different than the normal chlorine sampling points. The purpose is to cover as many different sampling locations as possible (refer to Table 1.0).

1.6.2 Turbidity

Turbidity measuring equipment should be calibrated as per the manufacturer's recommendations. All users shall include a record of equipment repairs and equipment calibration log (refer to Appendix VIII for an example).

The main purpose of testing for turbidity is to ensure water is filtered to a degree which ensures effective disinfection. If the turbidity is too high it will interfere with proper disinfection. Turbidity measurement must be done before water is introduced to a distribution system. Turbidity mitigation should also be done before the distribution

system to prevent potential contamination of the distribution system with poorly disinfected water.

Medium classification systems may be required to install continuous monitoring devices for turbidity measurements. For sampling frequency of different systems refer to Table 1.0.

Groundwater sources:

The raw water turbidity, before any filtration, should be measured as outlined in Table 1.0 to discern any trend that may indicate direct influence of surface water. The Water Quality Aspect Lead must be notified of any increases in turbidity on a priority basis since GUDI sources present higher risk factors for pathogen contamination than groundwater sources.

Surface water and GUDI sources:

Qualified operators are required to assess turbidity and to undertake necessary actions to ensure filtration treatment systems operate properly. Provincially certified operators are required for systems classified as very small and larger where the source water is surface or GUDI. Unqualified staff should not attempt to operate water filtration systems.

Turbidity is usually measured after filtration and before disinfection. In cases where the primary disinfection process is UV, turbidity should be measured before the UV treatment system.

For filters that are in series, turbidity is measured at the outlet of the last filter. For filters that are in parallel, (refer to definitions and for examples of each system) measure the turbidity at the end of each filter outlet. Turbidity is measured after filter maintenance and can indicate filter failure. After filter backwashing, water is run to waste until the turbidity levels return to acceptable levels and effective filter operation is restored.

1.6.3 Continuous Monitoring Requirements

Continuous monitoring equipment, other than those found on UV disinfection systems, must cause an alarm to sound in the event there is equipment failure, adverse results, or power failure. Continuous monitoring equipment must also record the date, time, sampling location and result of every test for the parameter, including the record of the result, of every test that causes an alarm to sound which will alert the water system operator.

1.7 MICROBIOLOGICAL TESTING

1.7.1 Minimum Testing

Table 1.0 outlines the minimum number and the frequency of samples to be collected from the system and to be analyzed for Total Coliforms and Escherichia coli (E. coli). All data results must be entered into the water quality database.

1.7.2 Sampling Locations

The location of distribution sampling points for microbiological testing should be decided by the Facility Manager/Construction Co-ordinator or designated water system operator in consultation with the Water Quality Aspect Lead after due consideration of local conditions. At least 50% of samples should be taken from the extremities of the distribution system. Each sample should be labelled consistently from every sampling event to identify its location within the water system (refer to section 2.1.4 for labelling details).

It is important to identify the locations where there is a long distribution system, because care must be taken to ensure that there is no microbiological growth developing within the distribution network. If microbiological growth is identified, then the proper steps need to be taken to remove the source of microbiological growth (refer to section 1.4.3 for disinfection methods).

If there is no distribution system, the sample can be collected immediately following treatment and/or from the furthest point from the treatment. For systems with no treatment (i.e., systems that are granted reduced requirements for primary disinfection treatment) samples should be collected from the source and from the furthest point from the treatment.

1.7.3 Raw Water Samples

Raw water or before treatment samples should be taken as outlined in Table 1.0. Raw water samples need not be collected for systems using surface water.

1.7.4 Periods of Shutdown

AAFC water system operators shall ensure that no potable water is supplied to a user of water after a period of shutdown until samples have been taken and tested and the results of the tests are acceptable.

1.8 CHEMICAL TESTING

1.8.1 Initial Characterization

Every system must undergo a full characterization of its raw water source for the parameters listed in Tables 1, 2, 3, and 4 in Appendix III (refer to Table 1.0 for frequency). All data results must be entered into the water quality database.

1.8.2 Sampling Locations – Organic and Inorganic Samples

The sampling point locations should be decided by Facility Manager/Construction Coordinator or designated water system operator and in consultation with the Water Quality Aspect Lead after due consideration of location conditions.

For lead, samples are taken at the 0 minute and 5 minute flushing times (refer to Water Sampling Video) at a point in the distribution system or plumbing that is likely to have an elevated concentration of lead, such as the point of use/end of the line. (For more information refer to Water Sampling Video, table 2.1 and Appendix V under development)

1.8.3 Disinfection By-products

Trihalomethanes (THM's) can occur in chlorinated water as a result of the reaction between the organic material in the water and chlorine added as a disinfectant. THM sampling is only conducted for systems using chlorine or chloramines for primary disinfection.

THM samples are taken at a point in the distribution system or plumbing that is likely to have the potential for formation of THM's, such as the point of use/end of the line.

1.9 ACCREDITED LABORATORIES

With the exception of operational sampling (e.g. chlorine residual and turbidity), samples for testing must be sent to an accredited laboratory as indicated by the Canadian Association for Environmental Analytical Laboratories (see <http://www.caeal.ca/>) or in Quebec, the Programme d'accréditation de laboratoires d'analyse environnementale (PALAE). Contact the AAFC Water Quality Aspect Lead for approved laboratories.

1.10 SYSTEMS RECEIVING TRANSPORTED (HAULED) WATER

At least one sample should be taken from the cistern (i.e. on-site storage) and tested daily for free chlorine or total chlorine residual. The type of disinfection used in the system from which the drinking water is obtained determines the type of residual test to use. If it provides chlorination and does not provide chloramination, the test should determine the amount of free chlorine in the water; or determine total chlorine residual, if chloramination is used.

If transported water is used to supply potable water to micro-systems, measurements of daily chlorine residual may not be required if UV disinfection equipment is installed at the beginning of the building water system (i.e. located after the transported water on-site storage facility or cistern). UV is considered a primary disinfection system and will provide microbacteriological safety at the outlet of the UV system if operated and maintained according to manufacturer's

recommendations. UV will not guarantee microbacteriological safety within a distribution system and therefore cannot be used for secondary disinfection purposes.

AAFC water system operators should ensure and document that the owner/operator of a water haulage vehicle used to transport water for human consumption ensures that:

- all water transported and sold for human consumption meets Health Canada drinking water objectives,
- the tanks or similar containers used to transport and store the water are used for no other purposes (the provider shall provide written certification by a Professional Engineer upon request);
- the tanks or similar containers used to transport and store drinking water are clearly marked in letters at least 15 cm in height with the words “Drinking Water” or the words “Potable Water”; and
- the tank and all hoses and other equipment which may come into contact with drinking water shall be constructed of material in accordance with Canadian Standards Association and be maintained so as not to contaminate the water (the provider shall provide written procedures and certification by a Professional Engineer upon request);
- equipment which comes in direct contact with the water is corrosion resistant and non-toxic (the provider shall provide written procedures and certification by a Professional Engineer upon request);
- samples of water from the tank of each vehicle are submitted to an accredited lab at least once every 3 months (the provider shall provide written documentation of this and certification by a Professional Engineer upon request).

1.10.1 Bottled Water Monitoring

Under Canadian legislation, bottled water is considered to be a food and is regulated under the Food and Drugs Act. Federal responsibility for regulating bottled water is accomplished by input from two federal departments. Health Canada sets the standards for bottled water and the enforcement of these standards is provided by the Canadian Food Inspection Agency (CFIA).

The bottled water industry in Canada has an association called the Canadian Bottled Water Association (CBWA), which also provides a monitoring role beyond that of the CFIA. CBWA conducts annual, unannounced plant inspections administered by an independent, internationally recognized organization of its members. It is not a mandatory requirement for bottled water purveyors to be a member of the CBWA. Information on membership of the CWBA can be found on their website.

<http://www.cbwa-bottledwater.org/>

AAFC should ensure that any bottled water source is monitored with regulator sampling by the supplier and request the records for our documentation. When it is not practical, AAFC should ensure microbiological and general water quality parameters are regularly

monitored by AAFC (approximately one sample per 600 L of bottled water or on a quarterly basis 10% of the 20 L bottled water or case flats, whichever is the lesser). The *Guidelines for Canadian Drinking Water Quality* will provide the basis for establishing the safety of bottled water.

Safe Storage

To maintain the purity of bottled water, Health Canada recommends that the smaller bottled water be refrigerated once it is opened, and preferably immediately upon purchase. The 18 L bottled water carboys should be dispensed through a refrigerated water cooler that is kept clean to avoid contamination. Check the bottling date and best-before-date on the bottle to determine the expiration date of the product. Do not use any bottled water after the expiration date. If no date is shown on the bottle ask your supplier for the best before date

Cleaning Bottled Water Dispensers

It is important that the design and construction of the water cooler presents no additional risk of contamination and is designed to be easily cleaned. All water contact surfaces/materials should be approved food grade material. Water coolers supplied with disposable cups should be provided with a sanitary-type dispenser and the cups should be designed for the dispensed water temperature. Cups should be properly protected and stored.

The components of water coolers should be examined regularly to determine the effects of cleaning and sanitizing chemicals and external environmental factors. Instructions on the operation and maintenance of water coolers should be available on site.

Bottle water dispensers/coolers shall follow the cleaning procedures outlined in Appendix X.

Additional information on bottled water can be accessed through the Health Canada and Canadian Food Inspection Agency websites.

1.11 POTABLE WATER SUPPLIED (MUNICIPAL)

In instances where treated water municipal enters an AAFC distribution system, the treated water should meet the AAFC Potable Water Guidelines and Standards at the point of entry and throughout the distribution system. Distribution system sampling strategies for chlorine residual and microbiological parameters (indicated in subsections 1.6.1 and 1.7) in the AAFC Potable Water Guidelines and Standards must be followed for municipal supplied potable water.

AAFC reserves the right to ask the supplier for records related to monitoring and treatment to ensure that the supplied water meets AAFC Potable Water Guidelines and Standards. If the supplier does not meet the AAFC Potable Water Guidelines and Standards, AAFC must undertake measures to ensure that the water meets AAFC Potable Water Guidelines and Standards (e.g. treatment, rechlorination, alternative sources, etc.).

1.12 ADVERSE RESULTS AND CORRECTIVE ACTIONS

Table 1.2 outlines corrective actions to be taken due to adverse test results. For corrective actions, “resample and test” means the following:

- (a) for corrective action that arises from testing a water sample for a microbiological parameter,
 - (i) immediately after notification from the laboratory of an exceedence, and as soon as the laboratory can accept the sample, collect a set of water samples, at approximately the same time, with,
 - (A) at least one sample from the same location as the sample that gave rise to the corrective action,
 - (B) at least one sample from a location that is at a significant distance upstream from the location described in (A), and
 - (C) at least one sample from a location that is at a significant distance downstream from the location described in (A), and
 - (ii) conduct, on the samples taken under step (i), the same test that gave rise to the corrective action, or
- (b) for corrective action that arises from the test of a water sample for a parameter that is not a microbiological parameter,
 - (i) collect a water sample from the same location as the sample that gave rise to the corrective action; and
 - (ii) conduct on the sample taken under (i), the same test that gave rise to the corrective action.

Template 3 in Appendix II provides the form to record an adverse result.

TABLE 1.2 CORRECTIVE ACTIONS		
Parameter	Adverse Results	Corrective Actions
Chlorine residual in the treatment plant	Chlorine residual drops to levels lower than acceptable design levels in one reading.	1) Restore disinfection (check feed pumps, contact time tanks, etc.) 2) If chlorine residual level is still low follow manufacturer’s recommendation for servicing equipment upstream of the location of adverse result. 3) If problem persists immediately issue a BWA (refer to SOPs on Potable Water Systems Communication and Potable Water Systems) and complete Template 3, Appendix II).

<p>Chlorine residual in the distribution system: too low</p>	<p>Two samples collected from the same location 15 minutes apart having a free or total chlorine residual concentration of unacceptable levels.</p>	<p>1) Immediately flush the water mains, check chlorine feed equipment and chlorine analyzer, and restore secondary disinfection to ensure that:</p> <ul style="list-style-type: none"> • a free chlorine residual of at least 0.2 mg/L is achieved at all points in the affected parts of the distribution system, if the system provides chlorination and not chloramination, or • a total chlorine residual of at least 1.0 mg/L is achieved at all points in the affected parts of the distribution system, if the system provides chloramination. <p>2) If the required levels of free chlorine or total chlorine cannot be quickly achieved at all points in the affected area, immediately issue a BWA, (refer to SOPs on Potable Water Systems Communication and Potable Water Systems) and complete Template 3, Appendix II.</p>
<p>Chlorine residual in the distribution system: too high</p>	<p>Two samples collected from the same location 15 minutes apart having a free or total chlorine residual concentration of unacceptable levels.</p>	<p>3) Immediately check chlorine feed equipment and chlorine analyzer, and adjust secondary disinfection to ensure that:</p> <ul style="list-style-type: none"> • a free chlorine residual of no more than 4.0 mg/L (as free chlorine) is present at all points in the distribution system, if the system provides chlorination and not chloramination, or • a total chlorine residual of no more than 3.0 mg/L (as combined chlorine) is achieved at all points in the distribution system, if the system provides chloramination. <p>4) Re-sample within 2 hours to ensure chlorine adjustment has been appropriate</p>

Parameter	Adverse Results	Corrective Actions
Turbidity	Two samples collected from the same location 15 minutes apart having an NTU >1	<ol style="list-style-type: none"> 1) Calibrate the equipment per requirements of continuous sampling equipment or handheld equipment. If the levels are restored return to normal operations. 2) If the levels are still high, backwash filters, review operational processes, correct any faulty process; follow manufacturer's recommendations including filter-to-waste if required. Assess the need to replenish or replace filters.; If the levels are restored, assess the requirement to flush the system and return to normal operations (once flushing is complete if required). 3) If the levels are still high, issue a BWA, (refer to SOPs on Potable Water Systems Communication and Potable Water Systems) and complete Template 3, Appendix II. 4) Take corrective action and flush the system. 5) Resample and test. If the levels are restored rescind the BWA (refer to SOPs on Potable Water Systems Communication and Potable Water Systems) and complete Template 3, Appendix II.
Chemical (Inorganic or Organic)	Level exceeds MAC	<ol style="list-style-type: none"> 1) Resample and test as soon as reasonably possible. 2) If the concentration still exceeds MAC consult with the Water Quality Aspect Lead.

**TABLE 1.2
CORRECTIVE ACTIONS**

Parameter	Adverse Results	Corrective Actions
<i>Escherichia coli</i>	Detected in a sample	<ol style="list-style-type: none"> 1) Immediately issue a BWA (refer to SOPs on Potable Water Systems Communication and Potable Water Systems) and complete Template 3, Appendix II. 2) Check the system: <ol style="list-style-type: none"> a. Primary disinfection: check the disinfection system (e.g. contact time, tank, feeding pumps, turbidity, UV lamps). b. Secondary disinfection: <ol style="list-style-type: none"> i. immediately flush the distribution system and ensure that an appropriate level of chlorine residual is achieved at all points in the affected parts of the distribution system and plumbing, and ii. maintain the chlorine residual in the affected parts of the distribution system and plumbing, c. Ground water supplied: <ol style="list-style-type: none"> i. if <i>E. coli</i> is detected in the raw water, discontinue pumping and shock the system. ii. if <i>E. coli</i> is detected in the distribution system follow actions outlined in 2b - Secondary disinfection above. 3) Immediately resample (collect two sets of 3 samples, each taken from different locations, 24-48 hours apart) and test. 4) If the adverse result persists, contact the AAFC Water Quality Aspect Lead. If the results indicate no <i>E. coli</i> present, then rescind the BWA as per SOPs on Potable Water Systems Communication and Potable Water Systems.

Total coliforms	Detected in a sample	<ol style="list-style-type: none"> 1) Resample and test as soon as reasonably possible from three points: upstream, middle, and downstream if possible. If the result indicate no Total Coliforms present return to normal operations. 2) If the results are still contaminated, check the system: <ol style="list-style-type: none"> a. Primary disinfection: check the disinfection system (e.g. contact time, tank, feeding pumps, turbidity, UV lamps). b. Secondary disinfection: <ol style="list-style-type: none"> i. immediately flush the distribution system and ensure that an appropriate level of chlorine residual is achieved at all points in the affected parts of the distribution system and plumbing, and ii. maintain the chlorine residual in the affected parts of the distribution system and plumbing, c. System granted reduced requirements from disinfection: <ol style="list-style-type: none"> i. if total coliforms are detected in the raw water, discontinue pumping and shock the system (Template 3, Appendix II). ii. if total coliforms are detected in the distribution system, follow actions outlined in 2b Secondary disinfection above. 3) Immediately resample (collect two sets of 3 samples, each taken from different locations, 24-48 hours apart) and test. 4) If adverse results persist issue BWA (refer to SOPs on Potable Water Systems Communication and Potable Water Systems) and complete Template 3, Appendix II. If the results indicate no Total Coliform present return to normal operations. <p>Appendix II, Template 3.</p>
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1.13 WARNING NOTICES

Warning notices are required for:

1. do not drink water (e.g. potentially contaminated sources, or very remote system that has not undergone a chemical characterization);
2. a temporary BWA to inform users that corrective action is being carried out. This type of notice must be rescinded.

Where required, warning notices should be posted in prominent locations where they are likely to be seen by those using water from the system and all taps. Also ensure that there are sufficient copies of the warning notices and instructions indicating where to post the warning notices.

Warning notices must be posted in prominent locations and in both official languages. The warning must be such that it is understood by individuals who may not be able to read, such as children or others who do not understand English or French. A sample of the sign to post which indicates not to drink the water is provided in Appendix IV.

1.14 NOTICE OF ISSUE RESOLUTION FOR BOIL WATER ADVISORY

A BWA may be rescinded if the following conditions are met:

- The microbiological quality, turbidity, or disinfectant residual of the treated water in at least two consecutive sets of samples taken within 48 hours of each other has returned to an acceptable level; and
- The treatment, distribution or operation malfunction has been corrected and sufficient water displacement has occurred in the distribution system to eliminate any remaining

contaminated water.

The water system operator shall ensure that a written notice is prepared and filed within seven days after the BWA is rescinded, summarizing the action taken and the results achieved. The notice must be sent to:

- AAFC Water Quality Aspect Lead.
- Health Canada/Local Health Authority

Refer to Template 4 in Appendix II for a copy of the Notice of Issue Resolution Template.

1.15 ANNUAL REPORT

An annual report will be requested through the EIPMS and shall be prepared in consultation with the water system operator. The annual reports are also a useful tool for auditing purposes.

The format for an annual report is outlined in Template 2 in Appendix II. The report will be requested by the AAFC Water Quality Aspect Lead.

1.16 RECORD KEEPING

Water system operators must ensure that all documents, records, reports and logs be retained for at least 10 years.

- 1) Sanitary survey and chemical characterization reports should be kept for the life of the water system.
- 2) Records of calibration and repairs to water quality instrumentation shall be kept with the instrumentation for three years.
- 3) A log of pump maintenance and repair (well pumps, chemical feed pumps, distribution system pumps, etc.) should be kept for the life of the mechanical system
- 4) A log of filter media maintenance and operations should be kept for the life of the filter system for systems requiring operator intervention to backwash or regenerate filter media
- 5) Record of operator certification and completion of water quality related training shall be kept for each individual indefinitely.
- 6) Record of Professional Status of individuals involved with system operation for the years that an action was performed shall be kept on file with any other pertinent information regarding a project.

1.17 OPERATOR CERTIFICATION AND TRAINING

Operational checks must be carried out by a certified operator, or a person working under the supervision of a certified operator who has been trained by the certified operator. This person must advise the certified operator of all the test results as soon as possible.

The person collecting samples for microbiological and chemical testing must receive appropriate awareness training (see section 2.1).

There is a need to improve and continue operator training and certification to ensure the delivery of safe potable water. This will be achieved in several ways which include:

- a) completion of micro system training for operators, (currently under development)
- b) ensuring adequate time for training,
- c) undertaking certificate renewal that is tied to training if required,
- d) online training for operators can be found at several locations on the internet. One site that has been reviewed and found to be very good by the Montana Water Centre at <http://watercenter.montana.edu/training/default.htm>.
- e) all documentation regarding operator certification and training shall be provided to the AAFC Water Quality Aspect Lead.

2.0 STANDARD OPERATING PRACTICES (SOPs) and BEST MANAGEMENT PRACTICES (BMPs)

2.1 SOP FOR THE COLLECTION AND HANDLING OF DRINKING WATER SAMPLES

The purpose of water sampling and analysis is to ensure the provision of safe potable water. As such, sampling and analytical activities must be carried out in a manner that produces data that accurately describes and represents the quality of the water in the supply system. A *representative* sample is one that reflects the characteristics of the source, and can be considered an accurate subset of the material being measured.

The location, time and method of sample collection must be adequately defined and must isolate the area of interest or concern (e.g. areas with lead solder). For example, when selecting the time and location of distribution system sampling, consideration must be given to peak usage periods, dead ends in the system, the extremities of the distribution system and residential plumbing. The person taking the sample must be cognizant of the conditions that the sample represents (e.g. lead in the pipe). Sampling points must be selected to address the intent of monitoring outlined in this document.

SOPs must be followed for recording sample information, maintaining chain-of-custody forms, and for sample labelling, transportation and storage procedures as outlined below.

A water sample arriving at the laboratory must be traceable to its origin, the time and date of collection, and must accurately reflect the characteristics at the location and time of sampling. Storage duration is also a consideration and the lag time between sample collection and analysis should be within maximum allowable holding times.

Potable water sampling training is available through the Water Quality Aspect Lead in a DVD produced by the Interdepartmental Water Quality Training Board. Table 2.1 outlines sampling requirements for different parameters for laboratory analysis; Table 2.2 outlines equipment for operational sampling and analysis.

TABLE 2.1
SAMPLING REQUIREMENTS FOR DIFFERENT WATER QUALITY PARAMETERS FOR LABORATORY ANALYSIS

Parameter	Sample Container	Min. Volume (mL)	Preservative	Max. Holding Time	Storage Conditions	Comments
Total coliforms & <i>E. coli</i>	Glass or plastic	250	30 mg sodium thiosulphate	48 hours	5° C +/- 3° C	Transported chilled not frozen
Volatile Organics	40 mL glass vials with Teflon-clad silicon rubber stopper	2x40	Sodium thiosulphate pill (10 mg) for chlorinated waters	14 days	Dark 5° C +/- 3° C	No headspace is allowed.
Metals (except mercury)	Glass or plastic	100 (0 min) 50 (5 min)	Nitric acid as provided by lab - add immediately upon collection	60 days	Room temperature for preserved samples	<ul style="list-style-type: none"> • Bottles with aluminium-lined caps are unacceptable. • This is an unfiltered sample.
Mercury	Glass	240	0.5-1.0 mL concentrated nitric acid and 5-10 drops of potassium dichromate solution per 250 mL, pH is maintained at <2; sample must be yellow colour	14 days	Room temperature for preserved samples	
Nitrate	Glass or plastic	10	None	7 days	5° C +/- 3° C	Samples may be frozen
Organochlorine Pesticides, total PCBs, Triazene herbicides, Phenoxyacetic acid herbicides and chlorophenols	1 L amber glass with Teflon-lined screw caps	900	None	20 days	Dark 5° C +/- 3° C	
Carbamate pesticides, and Organophosphorus pesticides, and Benzo(a)pyrene	1 L amber glass with Teflon-lined screw caps	900	For chlorinated water add 1mL of 25% w/v sodium thiosulphate solution	20 days	Dark 5° C +/- 3° C	
Cyanide (Free)	Glass or plastic	500	Sodium Hydroxide to pH of about 12	30 days	Room temperature	

TABLE 2.2
SAMPLING EQUIPMENT FOR OPERATIONAL WATER QUALITY PARAMETERS FOR OPERATOR
ANALYSIS

Parameter	Equipment Types	Additional Supplies needed	Testing Conditions	Comments/ Instructions
Turbidity				
Chlorine Residual				
pH				
Bacteriological presence/ absence				

2.1.1 Sampling Location

2.1.1.1 Raw Water

Raw water refers to the source water for the water supply system before existing or proposed treatment locations. In the case of hauled or municipally supplied water where it is not necessary to provide supplemental treatment, it is not necessary or practical to sample before the municipal treatment. In cases where before treatment sampling is required, the analysis will help in the characterization necessary to decide on treatment requirements. Changes to the temperature, pH, alkalinity, colour, turbidity and biological quality of the source water will affect the efficiency of, and may necessitate alterations to, the treatment process. Raw water characterization with respect to all parameters listed is required as outlined in Table 1.0.

For groundwater systems using more than one well supply, samples for microbiological testing are required from each well on the system.

Ideally, samples should be collected from a tap located as close as possible to the well. Usually a tap in the pump house is used. The waste from the tap, however, should not be allowed to drain back into the well.

In surface water systems, samples are generally taken after screening and pre-sedimentation. These samples will reflect any changes in source water quality resulting from these activities.

2.1.1.2 Treated Water

Treated water sampling locations must be selected to ensure that the samples represent the treated water after all treatment processes are complete. The sampling location must be at the point of entry of the water into the distribution system, after the minimum disinfection contact time and before the first consumer. Samples must be taken prior to standpipe, elevated tank or reservoir storage. In cases where hauled or municipally treated water is provided, the sampling point considered should be at the point of entry of AAFC property and point of entry to any buildings.

2.1.1.3 Distribution System Water

The selected sampling locations should be points significantly beyond the point of entry to the distribution system. These locations should represent and cover the distribution system, especially locations where the degradation of water quality and disinfection residual are possible and the formation of disinfection by-products is likely. Sampling locations should address elevated storage tanks within the distribution grid, dead ends, ageing water mains, distribution loops, points with the potential for cross connection/back flow and extremities of the distribution system.

2.1.2 Sample Collection

The collection and handling of samples is crucial to obtaining valid data. Water system operators collecting samples should be properly trained with respect to sample handling considerations, including procedures for the collection of samples for microbiological testing (viewing and understanding the water sampling training video referred to in section 1.0 will provide adequate training). If the inside of the sampling container is touched, it must be considered contaminated and should not be used. While the sample is being taken, the exterior of the cap should be held with the fingertips (for more information refer to Water Sampling Video, table 2.1 and Appendix V).

2.1.3 Labelling and Data Management

Currently AAFC uses the data management services provided by WaterTrax. This online service provides, among other functions, labelling for predetermined sampling locations (i.e. the sampling location should be determined and entered into the WaterTrax system before a sampling program begins). WaterTrax also allows the user to electronically gather lab information, consolidate and screen and organize the water data from all AAFC water systems across Canada. This system also provides alerts to inform designated staff of exceedences and possible health or operational issues from these incidences. It is the water system operator's responsibility to inform the AAFC Water Quality Aspect Lead on sampling points that will be utilised to ensure that the WaterTrax system is current. Additional information on WaterTrax is available at <https://www.watertrax.com/registration/signin.asp>.

2.1.4 Sample Storage and Transportation

It is recommended that all samples be delivered to the laboratory as soon as possible after sampling. Samples should be kept cool (refrigerated) if immediate shipping is not possible. Samples should be packaged to avoid breakage during shipping and should include ice packs to keep the sample cool but should not freeze the sample (loose ice is not acceptable for this). Samples must be shipped to arrive at the laboratory before the holding time for the samples has expired (refer to table 2.1).

2.1.5 Chain of Custody

A chain of custody is used to ensure the integrity of the sample and resulting data. Each person involved in the chain of possession must sign the custody form when a sample or set of samples is received or relinquished. A chain of custody form must accompany samples to the point of receipt by the laboratory. The intent of this form is to document the transfer of custody of the samples from the sample custodian (sampler) to any other person and to the laboratory. It is recommended that the fewest number of people as possible be responsible for sample collection and transfer to the laboratory. If common carriers are used, receipts should be kept and, if packages are mailed, they should be registered and return receipts requested. These should be kept as part of the chain of custody documentation (for more information, refer to Water Sampling Video, Table 2.1 and Appendix V).

2.2 BMP FOR WATER CONSERVATION

Public outreach and education is crucial to the success of any water conservation program. Engage your users in water conservation and efficiency programs through direct contact, annual reports, and posted signs. This provides a framework for your customers' acceptance and participation in the programs.

Installation of water meters at all facilities is the first step to implementing a water conservation program. Through the EIPMS, the Water Quality Aspect Lead will send a request for information to compile water use on a regular basis (once every year with an annual report). The water system operator should compile a water use database that stores water supply information and customer data including consumption and number of customers. Information on historical water usage is useful in many ways including projecting future demand and establishing system capacity requirements for sizing facilities. The impact of water conservation measures on demand can only be established if changes in historical consumption patterns can be tracked.

Develop a Water Conservation Program/Plan whenever considering a new construction or renovations to an existing property. The principal benefits of developing and successfully implementing a water conservation plan are the saving of time and money through focused action. Water conservation can provide reductions on both the supply and wastewater sides and reduce energy consumption.

2.3 BMP FOR SOURCE PROTECTION

The development of potable water quality guidelines is only one component of an overall approach to help ensure potable water supplies are kept clean, safe and reliable. The Canadian Council of Ministers of the Environment (CCME) 2004 publication *From Source to Tap* outlines a multi-barrier approach to safe drinking water that contains three major elements:

- source water protection;
- drinking water treatment; and,
- the drinking water distribution system.

Source water includes surface waters, aquifers or groundwater recharge areas. Source water protection based on watershed management involves a coordinated approach among all parties within the watershed to develop short and long term plans to prevent, minimize or control potential sources of pollution or enhance water quality. As a minimum, AAFC facilities should be aware of all potential operations (ranging from septic systems and fuel supplies on-site to industry, highways and rail lines in the watershed) which may adversely influence the quality of their raw water supply. Potable water treatment systems should be designed, constructed, operated and upgraded (as required) to provide potable water given the source water characteristics. Agricultural best management practices for protection of surface waters should be employed, for example the prevention of livestock access to watercourses and alternate water sources (e.g. use of nose pumps for livestock watering), proper manure storage, milkhouse washwater treatment, and use of buffer zones along stream corridors.

Some septic systems are designed to have their effluent discharge into a drainage field where the sewage undergoes some decomposition by microorganisms in the soil, as it works its way down to the groundwater table. To prevent groundwater contamination from this type of septic system, the septic system must be inspected annually and pumped out regularly to ensure no chemicals or other additives are added since these can prevent the septic system from functioning properly. If a system is not pumped out frequently enough, solid materials can leave the tank and enter the drainage field. Any substances poured down drains will also enter that drainage field and eventually reach the groundwater. In addition, every effort should be exercised to limit the amount of water entering the system (see BMP for water conservation).

Another component of source protection for groundwater suppliers is safeguarding the wellhead. To prevent surface water from ponding around the top of the well:

- Locate it away from low areas or depressions
- Well casing should be extended above the ground level by at least 0.4 meters
- Slope the ground surface away from the well and mound the earth around it so that any surface water quickly flows away from the casing
- Provide easy access to the well for maintenance, cleaning, treatment, repair, testing and inspection
- The annular space between the drill hole and the outside of the well casing must be sealed to at least 6 meters below ground level
- Maintain a permanent grassed buffer at least 3 meters around the well
- Contact an appropriate technical resource, if in doubt, about well head integrity.
- Set backs from point source of contamination (e.g. septic fields, underground storage tanks, etc.) to a groundwater source for a potable water systems should be reviewed by a hydrogeologist.

2.4 WELL ABANDONMENT AND DECOMMISSIONING

An abandoned well is defined as a well for which use has been permanently discontinued or is in an advanced state of disrepair, and can not be used for its intended purpose. The many

abandoned wells in Canada pose a threat to both human safety and groundwater quality as they act as a conduit for the movement of near-surface contaminants, such as farm wastes, pesticides, fuel and other chemicals from leaking storage tanks, septic system wastes, and storm water run-off into the underlying aquifer. Larger diameter, open, unused wells also present a physical hazard for animals and humans.

The guiding principle to be followed in the abandonment procedures is that the geological conditions that existed before drilling or construction of the well should be restored. The primary goals are to keep surface water from directly accessing ground water-bearing zones and to prevent water from different aquifer units from mixing through the well casing.

Activities involved in decommissioning a well may vary considerably depending on the type of well casing and the well depth and diameter.

Examples of such decommissioning activities include removal of the well casing, removal of pumping equipment, disinfection of the well, filling of the borehole with an impervious substance, backfilling the area with clay and adding topsoil at the surface. Re-vegetation occurs naturally or through seeding.

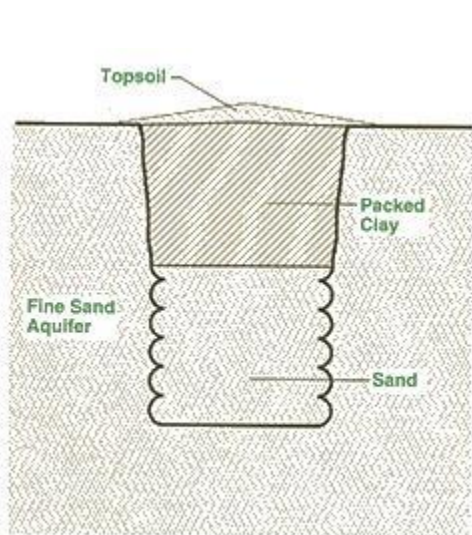


Figure 1: Example of Decommissioned Large Diameter Well

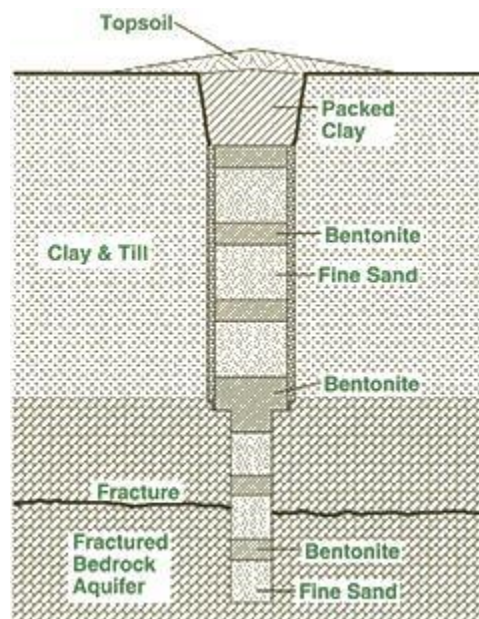


Figure 2: Example of Decommissioned Small Diameter Well

Historically, efforts were rarely made to properly decommission a water well but it is an important activity for environmental and human health issues. Methods and proper procedures for decommissioning a well are determined by provincial/territorial guidelines or regulations, where they exist. In some provinces, well decommissioning is highly regulated while, in others, decommissioning is broadly defined. It is recommended and in some case required that a licensed well contractor should be retained to seal the well properly (consultant with the Water Quality Aspect Lead for additional information). These contractors are familiar with correct

abandonment materials and procedures, are knowledgeable about wells, and have access to the necessary equipment. Required documentation on decommissioning is found in Template 5, Appendix II.

2.5 CROSS CONNECTION CONTROL

A cross-connection is the link or channel connecting a source of contamination with a potable water supply. The unwanted flow of used or non-potable water or substance, in most cases a liquid, tends to enter the potable supply if the net force acting upon the liquid acts in the direction of the potable supply (i.e. the pressure is greater on the non-potable source than the potable source).

The basic method for ensuring backflow does not occur is the use of a physical barrier to backflow which could be in the form of an air gap or a mechanical device such as a check valve.

All facilities must implement a cross connection control program. For facilities with no cross-connection control program in place, the first step is to investigate cross-connection control in general. Investigation of cross connection control and development of a plan should be carried out by a Professional Engineer with tester's license, a Certified Engineering Technologist with tester's license, a Licensed Master Plumber with contractor's and tester's license, or a Journeyman Plumber or Pipe Fitter with tester's license.

All facilities must ensure that plumbing works follow practices outlined in the National Plumbing Code (2005) and all backflow preventers must conform to CSA standards, and shall be certified by the CSA or a certification body recognized by the Standards Council of Canada. For more detailed information consult the CSA International publication "Manual for the Selection and Installation of Backflow Prevention Devices/Manual for the Maintenance and Field Testing of Backflow Prevention Devices."

Backflow from fire protection systems shall follow the Selection Guide for Backflow Prevention Devices on Fire Sprinkler and Standpipe Systems outlined in A-2.6.2.4.(2) in the National Plumbing Code (2005).

Please note that this document provides general guidance and summary information about a cross connection program. Additional information is available through the Water Quality Aspect Lead or consult the National Plumbing Code section 6.2 Protection from Contamination or CSA International publication B64.10-01/B64.10.1-01 Manual for the Selection and Installation of Backflow Prevention Devices/Manual for the Maintenance and Field Testing of Backflow Prevention Devices.

2.5.1 Documentation for a Cross Control Program

Cross-connection control programs should be in place in order to prevent contamination. Such programs include:

- Surveying established installations to rank them based on the degree of hazard that they present to the water system.

- Preparing a list of all testable backflow devices in the water system (Refer to Appendix IX Inventory of Backflow Preventers).
- Assessing new construction plans for cross connection hazards.
- Installing proper backflow preventers (backflow preventers must be testable).
- Inspecting and maintaining cross connection control devices on an annual basis, following manufacturers' instructions.
- Training and educating staff.
- Establishing protocols for notifying the building owner or responsible party to have a particular device tested.
- Setting out the qualifications which allow for a person to perform a building's cross connection control survey.
- Instituting a tamper policy.

2.5.2 Testing

An important element of a cross-connection control program is regular inspection and testing since a backflow preventer that is not functioning properly will be of little use to protect against backflow. Water supply backflow preventers must be tested in accordance with CAN/CSA-B64.10-01/B64.10.1-01, Manual for the Selection and Installation of Backflow Prevention Devices/Manual for the Maintenance, and Field Testing of Backflow Prevention Devices (2001).

2.5.3 Location and Type of Backflow Preventer

Sections 2.5.3.1, 2.5.3.2 and 2.5.3.3 provide standards for AAFC unless otherwise established by a Professional Engineer with tester's license or a water quality professional with tester's license.

2.5.3.1 Building Isolation

Isolation for a building shall be required even if the plumbing system in the building conforms to current plumbing or building code requirements and has individual backflow preventers on all individual hazards, because backflow into the public water supply can still occur if the individual backflow protection fails. Hazards for building isolation will dictate the type of backflow device required and it shall be divided into minor, moderate and severe categories.

1. Minor hazard — any cross-connection or potential cross-connection that constitutes only a nuisance, with no possibility of any health hazard;

Premises with a minor hazard classification shall be isolated with a Dual check valve (DuC) backflow preventer. This requirement shall not apply to residential premises if no hazards are present. The following are examples of buildings or facilities that shall be isolated from the water supply by a DuC backflow preventer:

- Residential premises with access to an auxiliary water supply;
 - Residential premises with multi-tenant single water service; and
 - Buildings with minor hazard classification.
 - Heating systems (copper/plastic; no chemicals)
2. Moderate hazard — any minor hazard as defined in Item (1) that has a low probability of becoming a severe hazard;

Premises with a moderate hazard classification shall be isolated with a Double check valve assembly (DCVA) backflow preventer. The following are examples of buildings or facilities that shall be isolated from the water supply by a DCVA backflow preventer:

- Multi-service interconnected facilities
- Office buildings
- Fountain, ornamental
- Heating systems (no chemicals added)
- Hose bibs
- Irrigation system (no chemical added)

3. High or severe hazard — any cross-connection or potential cross-connection involving any substance that could be a danger to health.

Premises with a severe hazard classification shall be isolated with a Reduced Pressure Principle Assembly (RP) backflow preventer. The following are examples of buildings or facilities that shall be isolated from the water supply by an (RP) backflow preventer:

- Laboratories
- Barns
- Building using radioactive material
- Petroleum storage facilities
- Chemical storage facilities
- Commercial laundries
- Sewage treatment plants
- Food and beverage processing plants
- Premises where access is restricted
- Auxiliary water supply
- Car wash
- Chiller tanks
- Fountain, ornamental (chemicals added)
- Heating systems (chemicals added)
- Irrigation system (chemical injected)
- Livestock equipment
- Meat packing plant
- Milk processing plant

Note: This is not an all inclusive list, more details can be found in Appendix IX or contact the Water Quality Aspect Lead for additional information.

2.5.3.2 Zone or Area Protection

When zone or area protection is provided, the isolated nonpotable and potable water piping systems shall be clearly identified as required by Canadian General Standards Board (CGSB) Standard CAN/CGSB-24.3.

2.5.3.3 Protection for Individual Connections

Protection against back siphonage from individual connections, such as hoses and laboratory faucets, shall generally be provided by using atmospheric, or pressure type vacuum breakers on the hose. When a connection requires protection from back pressure, a dual check valve, a dual check valve with atmospheric port, a dual check valve with intermediate vent, a double check valve assembly, or a reduced pressure principle assembly will be required. Consult the Water Quality Aspect Lead to determine the appropriate individual protection. For laboratory uses it is recommended that a Laboratory Faucet Type Vacuum Breaker (LFVB) is installed with zone or area protection.

2.6 ABANDONED WATER LINES

It is important to ensure that buildings or any works that are abandoned or demolished and that had a water line from a distribution system or directly from a source have the water line removed to the point of connection to the water system or source. Failure to ensure this is done could result in dead ends to your system and a source of bacteriological contamination.

A record of water line abandonment must be completed. (See Appendix II, Template 6.)

APPENDIX I

TREATMENT REQUIREMENTS

APPENDIX I - TREATMENT REQUIREMENTS

The purpose of this appendix is to provide the water quality professional with the AAFC requirements for disinfection/filtration. **This section is intended for background information.**

Chlorine Disinfection

Drinking water disinfection treatment requirements are specific to the type of raw water supply. Design of the treatment processes should consider the characterization, variability and vulnerability of the raw water supply. All water supplies should be individually assessed by measuring relevant water quality parameters and utilizing, where chemical disinfection is used, the CT tables provided to determine the appropriate disinfectant dosage.

This section outlines the disinfection (primary disinfection) requirements by the type or raw water supply, with variations based on vulnerability of the raw water supply, and includes any applicable pre-disinfection treatment (filtration) requirements. The CT disinfection concept uses the combination of a disinfectant residual concentration (in mg/L) and the effective disinfectant contact time (in minutes), to quantify the capability of a chemical disinfection system to provide effective pathogen inactivation to the required level. The use of this concept involves determining the CT values required at the actual, often variable, operating conditions (flow, temperature, and pH) and ensuring that the employed disinfection process achieves these values at all times.

Chemical disinfection CT values are calculated by multiplying the disinfectant residual concentration (in mg/L) by the disinfectant contact time (in minutes).

$$CT = \text{Concentration (mg/L)} \times \text{Time (minutes)}$$

The following Tables outline CT values for inactivation of viruses, Giardia and Crypto

**TABLE AI.1
CT VALUES FOR INACTIVATION OF VIRUSES BY FREE CHLORINE FOR pH 6-9**

Temperature (degrees Celsius)	2 log inactivation (99% removal)	4 log inactivation (99.99% removal)
5	4	8
10	3	6
15	2	4
20	1	3
25	1	2

C is the free chlorine concentration in mg/L

T is the contact time in minutes

For example, for a CT value of 6 for a temperature of 10°C and 4 log inactivation:

- if the contact time is 30 minutes, the Cl residual concentration must be 0.2 mg/L

For a Cl residual of 0.2 mg/L for 2 log removal at a temperature of 10:

- CT is 3 and the contact time must be 15 minutes

TABLE AI.2
CT VALUES FOR INACTIVATION OF *GIARDIA* CYSTS BY FREE CHLORINE AT pH 7 AND TEMPERATURE OF 15°C

Cl(mg/L)	2 log inactivation	3 log inactivation
0.6	48	72
1.0	50	75
2	55	83

TABLE AI.3
CT VALUES FOR INACTIVATION OF VIRUSES AND *GIARDIA* CYSTS BY OZONE

Temperature degrees Celsius	2 Log inactivation <i>Giardia</i> Cysts	2 Log inactivation Viruses
5	1.3	0.6
10	0.95	0.5
15	0.63	0.3
20	0.48	0.25
25	0.32	0.15

Ultraviolet (UV) Disinfection

The application of ultraviolet (UV) light is an acceptable primary disinfection process. A particular type and design of UV reactor may be considered acceptable if it has been shown to achieve the required level of disinfection. The UV equipment should meet recognized standards in order to ensure that the required level of primary disinfection is met for the use of the equipment in question. For point of entry treatment units, ANSI / NSF Standard 55A or equivalent can be used.

UV facilities should be designed taking into account appropriate reliability and redundancy measures, and the light transmission and scale formation/fouling potential in the UV reactor specific to the quality of the raw water supply. A dose of at least 40 mJ/cm² must be maintained throughout the life time of the lamp. While the use of UV light may be acceptable for the purpose of primary disinfection, it does not provide a disinfectant residual. Where there is a distribution system which requires the provision of secondary disinfection for a drinking-water system, primary disinfection must be followed by another process, normally chlorination, which introduces and maintains a persistent disinfectant residual throughout the distribution system.

For groundwater which is not under the direct influence of surface water, UV light is acceptable as a primary disinfection process.

Drinking water systems that obtain water from a raw water supply which is surface water or groundwater under the direct influence of surface water must have a treatment process that is capable of producing water of equal or better quality than a combination of well-operated chemically assisted filtration and disinfection. The use of UV light may only be acceptable as a primary disinfection process in combination with filtration. The following table outlines the performance of UV disinfection for the inactivation of viruses and protozoa

**TABLE AI.4
UV DOSE REQUIRED TO ACHIEVE LOG
INACTIVATION OF VIRUSES, BACTERIA AND PROTOZOA**

Type	Lamp Type	UV Dose (mJ/cm ²)	
		2 log	4 log
<i>E. coli</i>	Low pressure lamp	2	5.6
<i>Cryptosporidium</i>	Low pressure lamp	5	9.5
<i>Giardia</i>	Low pressure lamp	10	20
Adenovirus (type15) ⁴	Low pressure lamp	80	165
Poliovirus	Low pressure lamp	14	30

Since a UV dose of 40 mJ/cm² is usually used for drinking water disinfection, it can be seen that UV may not be effective in removing Adenovirus.

If primary disinfection is provided by UV light equipment, the operator must ensure that:

- The disinfection equipment has a feature that causes an alarm to sound in the building, or the location where the operator is present in the case of failure;
- Light disinfection equipment and any sensors that form part of the equipment's monitoring system must be checked and calibrated in accordance with the manufacturer's instructions; and
- The equipment is maintained regularly as per manufacturer's instructions. Table AI.5 outlines maintenance schedules for UV disinfection equipment.

⁴ Is found when there is cross contamination from septic systems/cross connection. In such cases, chlorine should be used.

**TABLE AI.5
MAINTENANCE SCHEDULE FOR UV DISINFECTION EQUIPMENT**

Task	Frequency
Ballasts inspection	3-6 months
Ballasts replacement	Every 5 years
Chemical cleaning	Monthly
Lamp replacement	5000 hours (7 months) to 8000 hours (11 months)
Mechanical wiper maintenance	Yearly
Sensor calibration	Yearly
Sensor replacement	Yearly or follow manufacturer's recommendations
Sleeve replacement	3-5 years

The advantages and disadvantages of the use of UV disinfection equipment are outlined below.

**TABLE AI.6
ADVANTAGES AND DISADVANTAGES OF UV DISINFECTION**

Advantages	Disadvantages
No disinfection by products	No taste and odour control
Inactivation of <i>Giardia</i> and <i>Cryptosporidium</i>	Does not remove colour
Low space requirements	No iron and manganese oxidation
Competitive costs	No residual disinfecting capabilities

Performance of different types of filtration technologies are outlined in Table AI.7.

**TABLE AI.7
LOG REMOVAL RATES OF DIFFERENT FILTRATION TREATMENT TECHNOLOGIES**

Treatment Technology	Log Removal Credit		
	<i>Giardia</i> Cysts	<i>Cryptosporidium</i> Oocysts	Viruses
Conventional Filtration	3.0*	2	2
Direct Filtration	2.5 *	2	1
Slow Sand Filtration	3.0 *	2	2
Diatomaceous Earth Filtration	2.0**	2	1
Cartridge/Bag Filters	2.0 +**	0	0
Membrane Filtration	3.0 +**	2	0.0 to 2.0 +

* Guidelines for Canadian Drinking Water Quality-Health Canada.

** Procedure for Disinfection of Drinking Water in Ontario, 2003 (MOE).

The following section provides an overview of the different filtration technologies and the conditions required to ensure the desired performance for the removal of *Giardia* cysts and *Cryptosporidium* oocysts.

Conventional Filtration

Conventional filtration is the most common treatment process currently used by drinking water systems that rely on raw water supplies which are from surface sources. This treatment process consists of chemical coagulation, rapid mixing, flocculation and sedimentation followed by rapid sand filtration.

In order to claim the 3 log *Giardia* cyst removal, the 2 log *Cryptosporidium* oocyst removal and 2 log virus removal credit, the filtration process must meet the following criteria:

- use a chemical coagulant at all times when the treatment plant is in operation;
- monitor and adjust chemical dosages in response to variations in raw water quality;
- maintain effective backwash procedures, including filter-to-waste or an equivalent procedure during filter ripening to ensure that the effluent turbidity requirements are met at all times;
- continuously monitor filtrate turbidity from each filter; and
- ensure filtered water turbidity of less than or equal to 0.3 NTU in 95% of the measurements each month.

Direct Filtration

The direct filtration process consists of chemical coagulation, rapid mixing and flocculation followed by rapid sand filtration. It is very similar to a conventional filtration process but without the sedimentation step prior to filtration. Generally, the use of direct filtration process is limited to raw water supply source with water turbidity of less than 20 NTU and colour less than 40 TCU.

In order to claim the 2.0 log *Giardia* cyst removal, the 2 log *Cryptosporidium* oocyst removal and 1.0 log virus removal credit, the direct filtration process must meet the conventional filtration criteria above.

Slow Sand Filtration

Slow sand filtration is a biological and physical process, equivalent to chemically assisted filtration, where the processes of adsorption and biological flocculation that take place in the microbial growth formed in the upper sand layer eliminate the need for chemical coagulation and flocculation. Generally, the use of a slow sand filtration process is limited to raw water supply source (or influent water after pre-treatment) having turbidity of less than 10 NTU and colour less than 15 TCU.

In order to claim the 2.0 log *Giardia* cyst removal, the 2 log *Cryptosporidium* oocyst removal and 2.0 log virus removal credit, the slow sand filtration process must meet the following criteria:

- maintain an active biological layer;
- regularly carry out effective filter cleaning procedures;
- use filter-to-waste or an equivalent procedure during filter ripening periods;

- continuously monitor filtrate turbidity from each filter or take a daily grab sample; or,
- meet the performance criterion for filtered water turbidity of less than or equal to 0.3 NTU in 95% of the measurements each month.

Diatomaceous Earth Filtration (DE)

Filtration using diatomaceous earth involves the passage of water through a layer of diatomite media supported on a fine metal screen, a porous ceramic material or a synthetic fabric supported on a septum. The initial diatomite layer is usually supplemented by a continuous feed of diatomite.

Generally, the use of a DE filtration process is limited to raw supply water source (or influent water after pre-treatment) having turbidity of less than 20 NTU and colour less than 15 TCU.

In order to claim 2.0 log *Giardia* cyst removal, 2 log *Cryptosporidium* oocysts removal and 1.0 log virus removal credit, the DE filtration process must meet the following criteria:

- maintain a minimum thickness of pre-coat;
- maintain effective filter cleaning procedures;
- maintain full recycle or partial discharge to waste of water flow during filter precoat until the recycle stream turbidity falls to below 1.0 NTU;
- continuously monitor filtrate turbidity from each filter; and
- meet the performance criterion for filtered water turbidity of less than or equal to 0.3 NTU in 95% of the measurements each month.

Cartridge/Bag Filters

This technology is designed to meet the low flow requirement needs of small systems. These filters can effectively remove particles from water in the size range of *Giardia* cysts (5-10 microns) and *Cryptosporidium* oocysts (2-5 microns). Cartridge filters do not remove any significant proportion of influent viruses. Generally, the use of cartridge/bag filtration processes is limited to raw supply water source (or influent water after pre-treatment) having turbidity of less than 5 NTU and colour less than 5 TCU.

Cartridge and bag filters are made from fibre, and unlike membranes, have a broad range of pore/opening sizes which allow penetration of a few larger sized particles than the filter rating. This small penetration rate by oversized particles should be taken into consideration along with the quality of the raw water supply.

In order to claim the 2.0 log *Giardia* cyst removal and the 2.0 log *Cryptosporidium* oocyst removal credit, the cartridge/bag filtration process must meet the following criteria:

- use filter elements and housing certified for surrogate particle removal evaluation in accordance with testing procedures and manufacturing quality control specified in ANSI/NSF Standard 53 or equivalent;
- ensure that differential pressures across the filter medium do not exceed ANSI/NSF

Standard 61 or manufacturer's rating; and

- meet the performance criterion for filtered water turbidity of less than or equal to 0.2 NTU in 95% of the measurements each month. [Note: Where it can be shown that turbidity results from the presence of inorganic particles of a size less than 2 microns, higher turbidity may be acceptable.]

Membrane Filtration

Membrane filtration processes involve passage of the water through a thin synthetic organic polymer film in a straining filtration step. Membranes that require moderate to low pressures for adequate flow (micro and ultra-filters) must have chemically formed and uniformly sized pores that are 1 micron or less in diameter. Higher pressure membrane filters (nano and reverse osmosis filters) have no pores but allow water to permeate or diffuse through the membrane.

In order to claim the 3.0 log *Giardia* cyst removal and the 2.0 log *Cryptosporidium* oocyst removal and virus removal credit, the membrane filtration process must meet the following criteria:

- maintain effective backwash procedures, including filter-to-waste or an equivalent procedure, to ensure that the outlet turbidity requirements are met at all times;
- monitor integrity of the membrane by continuous particle counting or equivalently effective means (e.g., intermittent pressure decay measurements);
- continuously monitor outlet turbidity; and
- meet the performance criterion for filtered water turbidity of less than or equal to 0.1 NTU in 95% of the measurements each month.
- ensure the facility is secured and monitored.

APPENDIX II

TEMPLATES

- Template 1: Sanitary Survey and Well System Checklist
“Well System Checklist”**
- Template 2: Potable Water System Annual Report**
- Template 3: Report of Adverse Result**
- Template 4: Notice of Issue Resolution**
- Template 5: Well Decommissioning Record**
- Template 6: Water line Abandonment Record**

TEMPLATE 1 (TO BE USED BY A CERTIFIED OPERATOR OR PROFESSIONAL ENGINEER)

Agriculture and Agri-Food Canada

Sanitary Survey

Main Centre or District Name:

Name of Site:

Potable Water System Details

System Name:

System Asset #:

System Classification

<input type="checkbox"/> <i>Micro</i>	<input type="checkbox"/> <i>Very Small</i>	<input type="checkbox"/> <i>Small</i>	<input type="checkbox"/> <i>Med</i>	*# of operational months (if classification changes during the year)
<input type="checkbox"/> Groundwater	<input type="checkbox"/> Surface	<input type="checkbox"/> GUDI	<input type="checkbox"/> Municipal	<input type="checkbox"/> Hauled
<input type="checkbox"/> <i>Seasonal</i>	<input type="checkbox"/> <i>Year Round</i>	Check one		# of months in operation

Item to Check	Yes	No	N/A	Action Required / Comments
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2. Treatment System

Inventory the follow treatment system:

<input type="checkbox"/> Is a treatment system present?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> If so :				
<ul style="list-style-type: none"> ▪ Is filtration present? If so list the system(s) ▪ 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> ▪ Is disinfection used? If so list the system(s) 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<ul style="list-style-type: none"> ▪ List other treatment 	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Item to Check	Yes	No	N/A	Action Required / Comments

3. Water Source				
Carry out the following activities:				
<input type="checkbox"/> Is the groundwater supply under the influence of surface water as defined by the Guideline?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> If so :				
<input type="checkbox"/> Is filtration part of the technology train used to treat raw water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you have to check with a trained professional to determine source classification (Hydrogeologist and/or professional engineer)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Have you reviewed the results of the full characterization and regular chemical testing of raw water (Tables A, B, C and D)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you observe any trends of water quality indicators such as nitrates, temperature, Chlorophyll a, pH?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Carry out Well System Checklist if the source of the raw water is from a well at end of sanitary survey	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is your water intake in a shallow area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Check the following records:				
<input type="checkbox"/> Did you observe any recent major changes to the source water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you observe any changes in watershed or water recharge area (i.e., livestock operations, sewage or sanitary discharges, heavy recreational or land development including expanded agricultural activities, forestry, pavement or building additions)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you observe any changes following recent heavy rains or flooding and any drought conditions? Or any changes in flow levels, look or smell of source water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Sampling Technique:				
Did you follow the standard operating practices for the collection and handling of drinking water? If not indicate aspects that were not followed:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.1. Sample History				
<input type="checkbox"/> Is there a history of adverse microbiological water sample results? Comment on the month and year of the event.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is there any history of adverse results from the distribution system? Comment on the month and year of the event.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> For the previous period of 24 consecutive months were there any adverse results;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Sample History					
Water Source Item to Check	Point Desc	Point Desc	Point Desc	Point Desc	Point Desc
Where were the samples taken?					
Specify number of water samples that were taken. Over what time period.					
What are the results of all of the samples (including positive and negative results)? (indicate attached results or refer to WaterTrax)					
4. Operational History	5. Y e s	6. N o	7. N/ A	8. Action Required/Comments	
<input type="checkbox"/> Have there been any changes/problems with operation of the distribution system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Have any mechanical difficulties or equipment failures occurred?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Have there been any operational deficiencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Has there been any period where testing of the system was not carried out according to requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Item to Check	Yes	No	N/A	Action Required	
<input type="checkbox"/> Have there been any of the following disruptions in the system recently? Check the appropriate ones and indicated if action is required.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Low pressure <input type="checkbox"/> Inadequate flushing <input type="checkbox"/> Bio-film presence <input type="checkbox"/> Cross-connections <input type="checkbox"/> Stagnant water (dead ends) <input type="checkbox"/> Inadequate flushing <input type="checkbox"/> Recent construction <input type="checkbox"/> Age and condition of pipes <input type="checkbox"/> Recent plumbing or system work					
What corrective actions have been initiated?					
<input type="checkbox"/> Has the system been temporarily disinfected according to correct procedures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/> Have distribution pipes been flushed thoroughly in the affected area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Item to Check	Yes	No	N/A	Action Required/Comments
<input type="checkbox"/> Have water re-samples been taken as required (a minimum of three samples per initial adverse test)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.1. Distribution and Plumbing Lines				
<input type="checkbox"/> Did you monitor for leaks, corrosion and scaling in pipes, decreases in water pressure, dead-ends, and unexplained increases in water usage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you find wet areas, greener vegetation, or melted snow along distribution lines (to locate potential leaks)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you fix any leaks, dead-ends, or other mechanical difficulties and equipment failures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you eliminate any cross-connections through the use of gaps, breakers, or other backflow prevention strategies or devices?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Treatment				
<i>Disinfection:</i>				
<input type="checkbox"/> Did you check the data management system to assess if there was any interruption in the disinfection process?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> If there were interruptions, why?				
<input type="checkbox"/> Is there proper residual entering the distribution system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Item to Check	Yes	No	N/A	Action Required/Comment
What is the residual?				
<input type="checkbox"/> Is the contact time between the point of disinfection and the first consumer adequate?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Are the temperature and pH of the water at the point of disinfection measured and recorded;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is there adequate spill containment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.2. Filtration				
<input type="checkbox"/> Is the filtration process performing as designed? Check turbidity of pre-disinfection water.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you establish control and assessment features to evaluate the performance of all	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

filters?				
<input type="checkbox"/> Is there parameter(s) to initiate a backwash?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is there an Operating & Maintenance Procedure?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Can the treatment process be interrupted by power outages? Have there been power outage interruptions? If so, what were their effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is there standby power available?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
What type of filter system is being used and what kind of media has been installed?				
What is the turbidity of the effluent water following the backwash?				
What is the turbidity of the backwash?				
<input type="checkbox"/> Is there any visible indication of problems on the surface of any filters i.e., particulate matter remaining on the surface, cracks, holes, depressions in the media surface?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Item to Check	Yes	No	N/A	Action Required
<input type="checkbox"/> Is the monitoring instrumentation (loss-of-head, effluent flow rate, and filter water turbidity) working for all filters?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Chemical Feed Systems				
<input type="checkbox"/> Did you record the Chemicals used and amount?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you calibrate the chemical feed system?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Did you record the chemical dosage and total quantity used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pump and Pumping Facilities				
<input type="checkbox"/> Is the building protected from flooding?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Can the equipment be accessed for maintenance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is there a log book for all pump assemblies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Consult the pump logs for maintenance and repair activities since the last sanitary survey Record the number of pumps and type of pumps; for each pump, answer the following questions:				
1. Pump Description:				
<input type="checkbox"/> Did you record the actual capacity and how it compares to the demand?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Does the equipment have excessive noise/vibration, leaking water, dirt and grime, leaking lubricants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

<input type="checkbox"/> Are the pumping systems equipped with check valves, pressure gauges, flow meters, air/vacuum relief valve, and blow-off line?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is there fail safe devices, failure alarm system for the motor control systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is the system secured and monitored?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2. Pump Description:				
Did you record the actual capacity and how it compares to the demand?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Does the equipment have excessive noise/vibration, leaking water, dirt and grime, leaking lubricants?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Are the pumping systems equipped with check valves, pressure gauges, flow meters, air/vacuum relief valve, and blow-off line?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is there fail safe devices, failure alarm system for the motor control systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the system secured and monitored?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Add additional sheets for other pumps as needed				

Item to Check	Yes	No	N/A	Action Required
8.3. Attachment I - Well System Check List				
<i>Well Location: Specify Name and Long Lats of well</i>				
<input type="checkbox"/> Is the Well located at a site where the elevation is higher than the immediate surrounding area; If not, inspect during a wet weather event to assess pooling of water around well head area: Does water pool at the well head?	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	
<input type="checkbox"/> Is the Well located at a site where the well is accessible for cleaning, treatment, repair, testing, inspection, and visual examination;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is the Well located inside well pits or in other locations that are prone to flooding or surface water contamination;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> If the Well is not a drilled well with watertight casings extending to a depth of 6 metres below ground level, is it located within 30 metres from septic systems and other pollution sources;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> If the Well is a drilled well with watertight casings extending to a depth of more than 6 metres below ground level, is it located at least 15 metres from septic systems and other pollution sources.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is the Well secured and access limited to appropriate staff.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Extended Buried Casings <input type="checkbox"/> Is the casing of a properly constructed well extended a minimum of 40 cm above grade.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Item to Check	Yes	No	N/A	Action Required
<u>Inspect Covers or Sanitary Seals for Cracks and Holes</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

<input type="checkbox"/> Are the seals watertight and in good condition; <input type="checkbox"/> Is the cover commercially manufactured, vermin-proof, and able to prevent the entry of surface water and foreign materials <input type="checkbox"/> Is the cover secured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>Licensed Well Contractor to Inspect the Inside of the Well</u> <input type="checkbox"/> Is the casing clean, free of contamination and watertight? <input type="checkbox"/> Did you observe signs of surface water seepage or water running freely into the well, <input type="checkbox"/> Did you observe seepage through cracks or stains on the inside of the casing; <input type="checkbox"/> Is the seal around the plumbing inlets in poor condition <input type="checkbox"/> Is the water seeping in from outside the well; <input type="checkbox"/> Are there any debris floating in the well; <input type="checkbox"/> Did you compare your well construction to diagrams that show proper design and maintenance techniques? <input type="checkbox"/> Did you correct any problems you discovered by retaining qualified contractors to carry out necessary repairs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Item to Check	Yes	No	N/A	Action Required
<u>Inspect the Condition of Air Vents</u> <input type="checkbox"/> Are the air vents extended above the land surface to a height that would prevent the entry of flood water from any anticipated flooding in the area; <input type="checkbox"/> Is the open end of the air vent shielded and screened to prevent entry of foreign materials into the well; <input type="checkbox"/> Is the air vent kept free of obstructions and blocks at all times?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<u>Inspection of the Area around the Well</u> <input type="checkbox"/> Did you take proper actions to ensure the area around the well a) in a neat and sanitary condition and b) away from all potential contamination sources, such as animals, fuel and equipment? <input type="checkbox"/> Did you look for settling of the ground around the outside of the well casing; <input type="checkbox"/> Did you take proper actions such as mounding the earth around the outside of the well casing if there is no slope or if some of the area is settled, <input type="checkbox"/> Is there a permanent buffer of grass or other vegetation extending at least 150cm from the well casing all directions; <input type="checkbox"/> Is the well secured with locking caps.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Item to Check	Yes	No	N/A	Action Required
<u>Inspection of the Area around the Water Storage</u> <input type="checkbox"/> Is the casing of a properly constructed reservoir extended a minimum of 40 cm above grade; <input type="checkbox"/> Are the seals watertight and in good condition; <input type="checkbox"/> Is the cover commercially manufactured, vermin-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

proof, and able to prevent the entry of surface water and foreign materials	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is the cover secured?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Are the air vents extended above the land surface to a height that would prevent the entry of flood water from any anticipated flooding in the area;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is the open end of the air vent shielded and screened to prevent entry of foreign materials into the well;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/> Is the air vent kept free of obstructions and blocks at all times.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments

Checklist of documentation (i.e. inspected by certified operator – provide number, P.Eng provide P. Eng number, calibration of instrumentation used and type)

Operator's Number _____

Professional Engineer Number _____

Instrumentation Used in Inspection:

Signature _____ **Date (dd/mm/yyyy)** _____

Print Name _____ **Position Name** _____

Title _____

History with site (e.g. length of time on site) _____

Agriculture and Agri-Food Canada

Template 2

Potable Water System Annual Report

(For reference only. The report will be requested through EIPMS)

Report Period From : To :
 (dd/mm/yy) (dd/mm/yy)

Main Site or District Name :
Name of Site:

POTABLE WATER SYSTEM DETAILS

System Name
System Asset #

System Classification

Measured flow Estimated flow check one

Micro Very Small Small Medium * # of operational months (if classification change during the year)

Groundwater Surface GUDI* Municipal Hauled check one

*Groundwater under the influence of surface water

Seasonal Year Round check one # of months in operation

SANITARY SURVEY

Requirement (Frequency*)	Planned (mm/yy)	Actual (dd/mm/yy)

OPERATIONAL CHECKS

Parameter	Planned Testing (Frequency*)	Actual Testing (Frequency)	Range (min/max values)	Number of test exceedances

Chlorine Residual (treated)				
Chlorine Residual (distribution)				
Turbidity (raw)				
Turbidity (treated)				

*Based on System Classification.

MICROBIOLOGICAL TESTING

Parameter	Planned Testing (Frequency*)	Actual Testing (Frequency)	Range (min/max values)	Number of test exceedances
E coli (raw)				
E coli (treated)				
E coli (distribution)				
Total coliform (raw)				
Total coliform (treated)				
Total coliform (distribution)				

Microbiological Testing: Exceedences

Parameter	MAC	Actual

CHEMICAL TESTING

One-Time Full Characterization (Tables A, B, C and D): Complete?

<input type="checkbox"/>	No	If not, provide date for proposed completion.	
<input type="checkbox"/>	Yes	If yes, provide date.	

Regular Chemical Testing: Required Schedule / Dates Completed

Test	Requirement (*Frequency)	Planned (mm/yy)	Actual (dd/mm/yy)
Inorganic (Table A) ^{1,2}			
Organic (Table B) ^{1,2}			
THM'S ^{1,2}			
Lead ¹			
Nitrate & Nitrite			

*Frequency: ¹ Based on System Classification, ² For year-round systems only

Chemical Testing: Exceedences

Parameter	Range of Actual Concentration	Number of test exceedences (min/max values)

IMPROVEMENTS / EQUIPMENT REPLACEMENT / CALIBRATIONS

Date	Description / Cost

REPORTS

Required attachments include: Incident Response Reports, Organic/Inorganic Test Results, other pertinent information.

Comments

Signature _____ **Date (dd/mm/yyyy)** _____

Print Name _____ **Position Name** _____

Title _____

History with site (e.g. length of time on site) _____

Agriculture and Agri-Food Canada

Template 3 - Report of Adverse Result

Main Centre or District Name:

Name of Site:

Potable Water System Details

System Name:

System Asset #:

System Classification

<input type="checkbox"/>	Micro	<input type="checkbox"/>	Very Small	<input type="checkbox"/>	Small	<input type="checkbox"/>	Medium		*# of operational months (if classification change during the year)
<input type="checkbox"/>	Groundwater	<input type="checkbox"/>	Surface	<input type="checkbox"/>	GUDI	<input type="checkbox"/>	Municipal	<input type="checkbox"/>	Hauled
<input type="checkbox"/>	Seasonal	<input type="checkbox"/>	Year Round	Check one				<input style="width: 40px; height: 15px;" type="text"/>	# of months in operation

Item to Check	Action/Comments
1) Location of the adverse result	
2) Date the adverse result	(dd/mm/yyyy)
3) Who conducted the sampling (name and title)	
4) Why was sampling initiated	
5) Sample contaminant details	
6) Date of notify manager/water quality aspect lead, etc.	(dd/mm/yyyy)
7) Name of local health authority official	
8) Date of the 1 st re-sampling	(dd/mm/yyyy)
9) Who conducted the sampling (name and title)	
10) Results of the re-sampling	
11) Date of the 2 nd re-sampling	(dd/mm/yyyy)
12) Who conducted the sampling (name and title)	
13) Results of the re-sampling	
14) Incident resolution	

15) Background (if there is a history of water quality exceedances at the site)

Comments

Instrumentation Used in Inspection:

Signature _____ **Date (dd/mm/yyyy)** _____

Print Name _____ **Position Name** _____

Title _____

History with site (e.g. length of time on site) _____

Agriculture and Agri-Food Canada

Template 4 - Notification of Issue Resolution

Main Site or District Name:

Name of Site:

Potable Water System Details

System Name:

System Asset #:

System Classification

<input type="checkbox"/>	<i>Micro</i>	<input type="checkbox"/>	<i>Very Small</i>	<input type="checkbox"/>	<i>Small</i>	<input type="checkbox"/>	<i>Medium</i>	*# of operational months (if classification change during the year)
<input type="checkbox"/>	<i>Groundwater</i>	<input type="checkbox"/>	<i>Surface</i>	<input type="checkbox"/>	<i>GUDI</i>	<input type="checkbox"/>	<i>Supplied by others</i>	
<input type="checkbox"/>	<i>Seasonal</i>	<input type="checkbox"/>	<i>Year Round</i>	<i>(Check one)</i>			<input type="text"/>	<i># of months in operation</i>

Please answer the following questions about your water system :

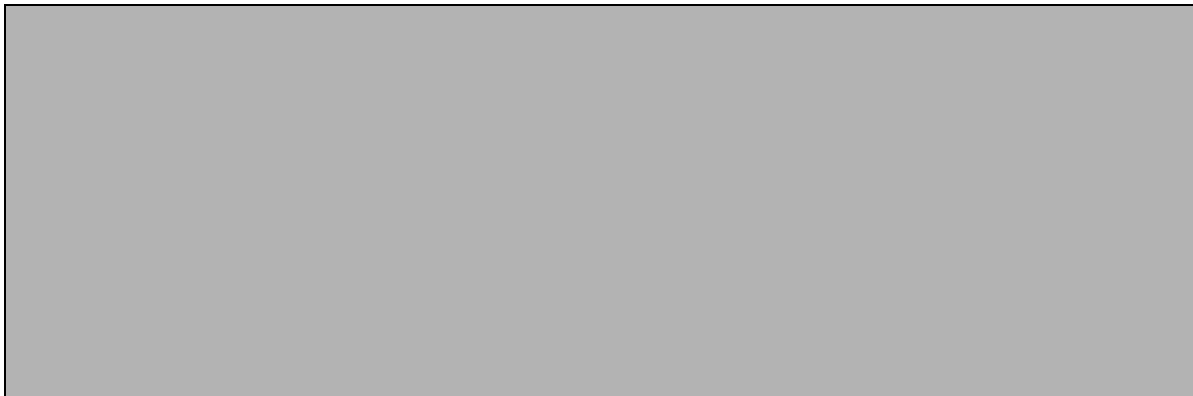
Location of the adverse result

Nature of Event			
Ice storm		Hurricane	
Blackout		High winds	
Terrorism		Flooding	
Tornado		Vandalism	
Thunderstorm		Other	
Services Disrupted			
Pump			
Water Softener			
Other Filtration System			

	Yes	No
CONTACTS MADE AND ACTIONS TAKEN		
Contacted Local Health Authority Date Time		
Contacted Local Occupational Health and Safety Representatives Date Time		
Contacted individuals as per Communication SOP Date Time		
Issued “_____ <i>Advisory</i>” Date Time		
Implemented Emergency Disinfection Procedures Date Time		
Collected First Bacteriological Sample from the Distribution System Date Time		
Collected Second Bacteriological Sample from the Distribution System Date Time		
Obtained Approval to Rescind “_____ <i>Advisory</i>” Date Time		

Action Taken

Send copy to Water Quality Aspect Lead and ISM



Incident Resolution: please mark the appropriate resolution taken and the date on which it was conducted

Resolution	Yes	No	N/A	Comments/Date of taking action (dd/mm/yyyy)
Backwashing filter(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Disinfection equipment repair	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flushing of distribution system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Changing of cartridge filter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Calibration of measuring equipment devices e.g. turbidity and chlorine residual metres	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Fixing a leaky system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Others : please specify				

Comments

Signature _____ **Date (dd/mm/yyyy)** _____

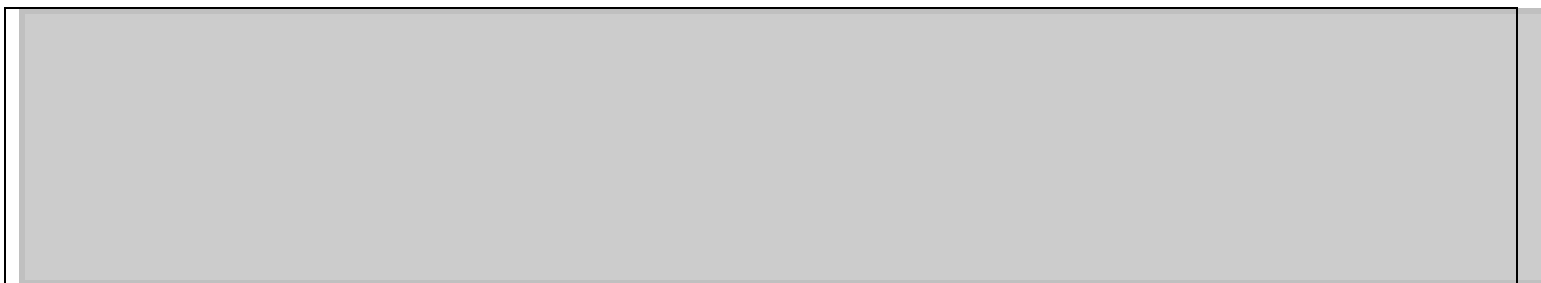
Print Name _____ **Position Name** _____

Title _____

History with site (e.g. length of time on site) _____

Template 5 - Well Decommissioning Records

Template 5 - Well Decommissioning Records		
Item	Record	Comments
Name and number of well		
Well description		
Description of area adjacent to well		
Casing diameter (at construction/at abandonment)		
Casing Length at (construction/at abandonment)		
Reason for abandonment		
Date of construction		
Date of abandonment		
Well Coordinates (Long, Lats)		
Well Contractor Name and number for abandonment		
Materials used for abandonment		
Signature _____ Date (dd/mm/yyyy) _____		
Print Name _____ Position Name _____		
Title _____		
History with site (e.g. length of time on site) _____		



Template 6 – Water Line Abandonment Record

Item	Description	Comments
Name and description of building or area serviced by the water line		
Reason for abandonment		
Length of water line abandoned		
Diameter of water line abandoned		
Sketch of line abandonment area and other remaining water lines (use dotted line for abandoned water line)		
Was water line removed or just disconnected? Describe		
Date of abandonment		
Water line disconnection point coordinates (Long, Lats)		
Contractor Name		
Description of materials used / steps taken to prevent leaks post-abandonment		

Signature _____ **Date (dd/mm/yyyy)** _____

Print Name _____ **Position Name** _____

Title _____

History with site (e.g. length of time on site) _____

APPENDIX III

Tables for Organic, Inorganic & Radionuclide Parameters and Chemical/Physical Objectives – Not Health Related

TABLE AIII.1. Inorganic Parameters

Parameter	MAC (mg/L)
Antimony	0.006
Arsenic	0.010
Barium	1
Boron	5
Cadmium	0.005
Chromium	0.05
Lead	0.01
Mercury	0.001
Selenium	0.01
Sodium	200
Uranium	0.02
Fluoride	1.5
Nitrate/Nitrite	10 (as N)

Source: Guideline for Canadian Drinking Water (Health Canada 2000)

TABLE AIII.2. Organic Parameters

Parameter	MAC(mg/L)
Alachlor	0.005
Aldicarb	0.009
Aldrin + Dieldrin	0.0007
Atrazine + N-dealkylated metabolites	0.005
Azinphos-methyl	0.02
Bendiocarb	0.04
Benzene	0.005
Benzo(a)pyrene	0.00001
Bromoxynil	0.005
Carbaryl	0.09
Carbofuran	0.09
Carbon tetrachloride	0.005
Chlordane (Total)	0.007
Chlorpyrifos	0.09
Cyanazine	0.01
Diazinon	0.02
Dicamba	0.12
1,2-Dichlorobenzene	0.2
1,4-Dichlorobenzene	0.005
Dichlorodiphenyltrichloroethane (DDT) + metabolites	0.03
1,2-Dichloroethane	0.005
1,1-Dichloroethylene (vinylidene chloride)	0.014

TABLE AIII.2. Organic Parameters (cont'd)

Dichloromethane	0.05
2-4 Dichlorophenol	0.9
2,4-Dichlorophenoxy acetic acid (2,4-D)	0.1
Diclofop-methyl	0.009

Dimethoate	0.02
Dinoseb	0.01
Diquat	0.07
Diuron	0.15
Glyphosate	0.28

Heptachlor + Heptachlor Epoxide	0.003
Lindane (Total)	0.004
Malathion	0.19
Methoxychlor	0.9
Metolachlor	0.05
Metribuzin	0.08
Monochlorobenzene	0.08
Paraquat	0.01

Parathion	0.05
Pentachlorophenol	0.06
Phorate	0.002
Picloram	0.19
Polychlorinated Biphenyls (PCB)	0.003
Prometryne	0.001

TABLE AIII.2. Organic Parameters (cont'd)

Simazine	0.01
THM'S (NOTE: show latest annual average)	0.1
Temephos	0.28
Terbufos	0.001
Tetrachloroethylene	0.03
2,3,4,6-Tetrachlorophenol	0.1
Triallate	0.23
Trichloroethylene	0.005
2,4,6-Trichlorophenol	0.005
2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)	0.28
Trifluralin	0.045
Vinyl Chloride	0.002

TABLE AIII.3. Radionuclide Parameters

RADIOLOGICAL PARAMETERS	MAC⁵
Gross alpha activity	0.5 Bq/L
Gross beta activity	1 Bq/L
Uranium	20 µg/L
Lead-210	0.1 Bq/L
Radium-226	0.5 Bq/L
Radium-228	0.2 Bq/L

Monitoring of Radioactivity in Drinking Water Sources

As discussed in Health Canada (2006), for the initial screening of radioactivity in new drinking water supplies, or in supplies with no historical radioactivity data, water samples should be analyzed for the common radionuclides known to occur in Canadian water supplies, along with the measurement of gross alpha and gross beta radioactivity. (This presumes that artificial sources of radioactivity are not known to be present.) The common radionuclides in surface waters include total uranium (usually measured in chemical form in µg/L), radium-226 (Ra-226), radium-228, and lead-210 (radionuclides measured in becquerels per litre, Bq/L)⁶. With the exception of Ra-228 which is from the natural thorium (Th-232) radioactive decay series, the other analytes are from the natural uranium (U-238) decay series.

For initial screening purposes, the measured uranium and radionuclide concentrations may be compared to their respective Maximum Acceptable Concentrations (MACs). [It should be noted that the MACs refer to annual average concentrations.] As cautioned by Health Canada (2006), gross radioactivity screening is imprecise, with either false positive or false negative results being distinct possibilities. Health Canada does not recommend specific numerical values for gross alpha and beta screening of drinking water supplies. However, Health Canada also suggests that screening levels of 0.5 Bq/L and 1 Bq/L for gross alpha and beta activities, respectively, as recommended by WHO (2004), can offer some guidance on appropriate levels to be used for screening purposes.

If the gross alpha activity exceeds the suggested screening level, the potential alpha contributions from the measured uranium and Ra-226 should be assessed. If the gross beta activity exceeds the suggested screening level, and the level is not explained by the measured Ra-228 or Pb-210

⁵ As proposed by Health Canada (2006).

⁶ The U.S. Environmental Protection recommends the initial monitoring of gross alpha, Ra-226, Ra-228 and uranium [if the gross alpha level exceeds 15 picocuries/L (0.56 Bq/L)] in new drinking water sources (U.S. EPA 2002). New sources may also have to sample for beta and photon (gamma radiation) activity if required by the State.

levels, the samples should also be analyzed for the naturally occurring beta emitter potassium-40 (K-40). The gross beta activity minus the K-40 activity should then be compared to the gross beta screening level. (There is no MAC for K-40 because its level in the body is homeostatically controlled and is not influenced by variations in environmental levels.)

Any unexplained gross alpha or beta levels above screening levels would require confirmatory analyses and site-specific consideration of other potential sources of radioactivity.

TABLE AIII.4. Chemical/Physical Objectives- Not Health Related

Parameter	Objective	Type of Objective ^a
Alkalinity (as CaCO ₃)	30-500 mg/L	OG
Aluminium	0.10 mg/L	OG
Chloride	250 mg/L	AO
Colour	5 TCU	AO
Copper	1 mg/L	AO
Dissolved organic carbon	5 mg/L	AO
Ethylbenzene	0.0024 mg/L	AO
Hardness (as CaCO ₃)	80-100 mg/L	OG
Iron	0.30 mg/L	AO
Manganese	0.05 mg/L	AO
Odour	Inoffensive	AO
Organic Nitrogen	0.15 mg/L	AO
pH	6.5-8.5 (no units)	AO
Sodium	^b	AO
Sulphate	500 ^c	AO
Sulphide	0.05mg/L	AO
Taste	Inoffensive	AO
Temperature	15 degrees Celsius	AO
Toluene	0.024 mg/L	AO
Total dissolved solids	500 mg/L	AO
Xylenes	0.30 mg/L	AO
Zinc	5.0 mg/L	AO

a) Short forms:

Aesthetic objective-AO, Operational guideline- OG, True colour units- TCU

b) The aesthetic objective for sodium in drinking water is 200mg/L. The Medical Officer of Health should be notified when the sodium concentration exceeds 20mg/L so that this information may be disseminated to local physicians for their use with patients on sodium restricted diets.

c) When sulphate levels exceed 500mg/L water may have a laxative effect on some people.

APPENDIX IV

“Do Not Drink Water” Sign



**Do not
drink water**

**Ne pas
boire l'eau**



Agriculture and
Agri-Food Canada

Agriculture et
Agroalimentaire Canada

APPENDIX V

MICRO-SYSTEMS' TRAINING MODULE COURSE (AAFC) (UNDER DEVELOPMENT)

Water Sampling Procedures for Bacteriological Quality

1. Collect water samples from the kitchen taps at each of the manager and rider accommodation (as per labels supplied in the container).
2. Attach the WaterTrax label to the sample bottle and the Chain of Custody.
3. Ensure that there is no strainer on the faucet.
4. Wash hands thoroughly.
5. Leave the water running for three (3) minutes.
6. Reduce the water flow to a steady stream.
7. Remove the cap off the bottle and hold it in one hand and the bottle in the other. Do not rinse the bottle. The power in the bottle is meant to be there and will not contaminate your sample. Use a new bottle if you do. Sample bottles are sterile and can easily be contaminated.
8. Do not lay the cap down or drop it. Do not touch the inside of the cap or the mouth of the bottle. Use a new bottle if you do. Sample bottles are sterile and can easily be contaminated.
9. Carefully fill with water to the shoulder of the bottle.
10. Put the cap back on the bottle such that the inside of the cap or the mouth of the bottle is untouched.
11. Fill in the Chain of Custody with the Date/Time sampled and **immediately** send it and the water bottle to the laboratory in the cooler provided.
12. It is recommended that sampling occur early in the week (preferably Monday or Tuesday). Samples received later in the week may not meet the laboratory hold times and, therefore, will not be tested. All samples must be kept cool during shipping by means of a small cooler and reusable ice pack (this will be supplied by the laboratory).
13. **Send the samples by the quickest method available - priority post, bus or courier.** A return address sticker will be inside the sample container. Please place this on the outside of the container prior to shipping. Shipping charges are to be paid by your pasture.

Water samples older than three (3) days will not be tested for bacteria. Samples older than 48 hours will be flagged as questionable.

NOTE: Flaming or disinfecting of the tap prior to bacteriological sampling is not required.

APPENDIX VI

DECHLORINATION

APPENDIX VI - DECHLORINATION

The Canadian Environmental Quality Guidelines, as well as most of the provincial regulations, require that chlorine residual concentration should not exceed 2 µg/L for discharges to receiving waters. As a result, dechlorination of chlorinated water is mandatory prior to discharge. There are a number of chemical and non-chemical methods for dechlorination. The non-chemical dechlorination method is used for discharges where the amount of water is limited since the dechlorination process requires some time to affect the chlorine reduction. The most common methods are:

- retention in holding tanks where chlorine residual is decreased after a few days,
- flow over pavement or gravel however; reduction of chlorine residual is minimal unless the water flows over a long distance e.g. 1 km.

The chemical dechlorination method entails the use of chemical agents such as activated carbon, sulphur dioxide, sodium bisulphite, sodium sulphite, and sodium thiosulfate. It should be noted that activated carbon is seldom used for it is more expensive than the other agents. The following table outlines the dose of each dechlorination agent to achieve the threshold of 2 µg/L.

**TABLE AVI.1
DECHLORINATION AGENTS, FORMS AND DOSES**

Dechlorination Agent	Forms Available	Dose at pH 7.0 (mg/mg Cl)
Sulphur dioxide	Gas	0.99
Sodium bisulphite	Powder/crystal	1.61
Sodium thiosulfate	Powder/crystal	1.9
Sodium sulphite	Powder/crystal	1.96



APPENDIX VII

CONTRACT EXAMPLE FOR FLUSHING WATER LINES



Table of Contents	Section 00000	February 2006
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<u>Section Title</u>	<u>Pages</u>
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Division 01

01005	General Instructions	2
01545	Safety Requirements	1
01561	Environmental Protection	1

Division 02

02662	Cleaning Water Mains Pigging Swabbing	3
02080	Asbestos Abatement Minimum Precautions	4
Appendix A	Schedule of Acceptable Disruptions and photos	3

- 1) Reference
- .1 National Building Code of Canada (NBC) 1985. Including all amendments up to tender closing date.
 - .2 AWWA C651-05, Standard for Disinfection of Water Storage Facilities
- 2) Location of Site
- .1 Pacific Agri-Food Research Centre, Agassiz 6947 #7 Highway, Agassiz B.C.
- 3) Description of Work
- .1 Work under this contract includes all labour, materials, and equipment required to:
 - .1 Clean and flush water mains with foam swabs. (approximately 950 metres)
 - .2 Super-Chlorinate all water lines with the last swabbing to a slug level of 100mg/l and a consistent 50mg/l throughout the system. The 50mg/l level must be maintained for a minimum of 3 hours.
 - .3 After the 3 hours, the chlorinated water will be flushed out of the main lines.
 - .4 Failure to achieve the .3 parameters will require repeating the entire chlorinating process, with no cost to PARC, Agassiz. This will most likely have to be done the next day, as there is limited down time allowed each day. Levels will be checked by a Water Quality Specialist from Agriculture and Agri-Food Canada.
 - .2 Chlorinating, and flushing must be done between 10:00 a.m. and 4:00 p.m.. We can only have the water system shut down for this period, because we have plants and animals that require water. Any set up work that does not require shut down of the water supply can be done before hand.
- 4) Codes
- .1 Perform work in accordance with the National Building Code of Canada (NBC) and any other code of Provincial or local application provided that in any case of conflict or discrepancy, the more stringent requirements shall apply.



- .2 Meet or exceed requirements of:
 - .1 contract documents
 - .2 specified standards, codes and referenced documents.

- 5) Documents Required .1 Maintain at job site, one copy each of the following:
 - .1 specifications
 - .2 addenda
 - .3 change orders
 - .4 other modifications to the contract
 - .5 field test reports

- 6) Work Schedule .1 Work to be done on date confirmed by email between PARC, Agassiz staff and contractor.

- 7) Site Visits .1 Contractors tendering on this contract are required to visit a pre-tendering briefing to fully familiarize themselves with site conditions and requirements of the contract prior to submitting tenders. This briefing will be held at a time selected by PARC staff.

- 8) Project Meetings .1 Not required for this work.

- 9) Location of Equipment .1 Location of equipment, fixtures and outlets indicated or specified are to be considered as approximate.

- 10) Existing Services .1 Before commencing work, establish location and extent of service lines in area of work and notify PARC staff of findings.
 - .2 Shut off water supply to each building affected by work done, if required. The main water supply cannot be shut down for more than 6 hours in one day.

- 11) Alterations or Repairs .1 Execute work with the least possible interference or disturbance to occupants, public and normal use of premises. Arrange with PARC staff to facilitate execution of work.

- 12) Asbestos Discovery .1 All main water lines are AC pipe.



Safety Requirements

Section 01545

-
- 1) Related Work .1 Asbestos Abatement Minimum Protection: 02080
 - 2) Construction Safety .1 Observe construction safety measures of National Building Code, 1990, Part 8. Provincial Government, Workers Compensation Board, and any municipal authority provided that in any case of conflict or discrepancy the most stringent requirements shall apply
 - 3) Overloading .1 Ensure no part of work is subjected to loading that will endanger its safety or will cause permanent deformation.
 - 4) Minimum Work Practice: Asbestos Containing Products
 - .1 In view of the fact that inhalation of asbestos fibres may be hazardous to health, but without in any way guaranteeing their effectiveness as protection against health hazards, the following practices shall apply.
 - .2 When working with asbestos cement pipe comply with recommendations of Asbestos-Cement Pipe Producers Association “Recommended Work Practices for A/C Pipe” subject to more stringent requirements of Section 02080.
 - .3 Upon completion of work, clean work areas using wet methods or high efficiency particulate air-filtered vacuum equipment. Remove waste asbestos-containing material in sealed containers labelled as to contents to disposal area acceptable to authorities having jurisdiction.
 - .4 In event of conflict between these requirements and those of Provincial Governments, Workers Compensation Board of British Columbia, Labour Canada, or Health and Welfare Canada, more stringent requirements shall apply.
 - 5) WHMIS .1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health and Welfare Canada.





Environmental Protection

Section 01561

- 1) Fires .1 Fires and burning of rubbish on site is not permitted.
- 2) Disposal of wastes .1 Do not bury rubbish and waste materials on site.
- .2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinners into waterways, storm or sanitary sewers.
- 3) Drainage .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
- .2 Do not pump water containing suspended materials into waterways, sewer or drainage systems.
- .3 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.
- 4) Pollution Control .1 Maintain temporary erosion and pollution control features installed under this contract.
- .2 Chlorine residual concentrations should not exceed 2 µg/L for discharges to any receiving waters areas.
- .3 Do not dispose of water in septic fields.

Cleaning Water Mains (Swabbing)

Section 02662

PART 1 - GENERAL

- | | | |
|---------------------------------|----|---|
| <u>1.1 Related Work</u> | .1 | General Instructions - Section 01005 |
| | .2 | Safety Requirements - Section 01545 |
| | .3 | Environmental Protection - Section 01561 |
| | .4 | Asbestos Abatement Minimum Precautions
- Section 02080 |
| <u>1.2) Reference Standards</u> | .1 | CETO C-98-15W-022/TP-011, 77-05-30 |
| | .2 | ANSI / AWWA C651-92. |
| <u>1.3) Scheduling of Work</u> | .1 | Work to be scheduled and confirmed by email between
PARC, Agassiz staff and contractor. |
| | .2 | If chlorination needs to be repeated, it must be at a time
approved by PARC staff. |
| | .3 | Appendix A includes a schedule of acceptable disruptions
of water services to the station. |

PART 2 - PRODUCTS

- | | | |
|------------------------|----|---|
| <u>2.1) Foam Swabs</u> | .1 | Contractor to submit type and size to PARC staff for
approval. |
|------------------------|----|---|

PART 3 - EXECUTION

- | | | |
|---|----|--|
| <u>3.1) Launch and Retrieval Points</u> | .1 | Swabs to be launched from exterior connection at pump
house (see photo in appendix). This will require a pump
and tank to push the swab into the main water line. Once
the swab is in the main water line, the fire pump, or
domestic pumps can be used to push the swab through the
main water line and out the last hydrant connection. |
| | .2 | A four inch connection and diffuser will be required for
the hydrant at the RCMP station. This is to ensure that we
get super chlorinated water into the 6" water line feeding
the RCMP building. |

Cleaning Water Mains (Swabbing)

Section 02662

- 3.2 Swabbing
- .1 All valves shall be checked to ensure that they are operating satisfactorily to ensure isolation of each section preventing loss of swabs.
 - .2 Insert swab into launch port.
 - .3 A minimum of 5 sets of swabs will be run through all portions of the main line.
 - .4 If the swab should fail to emerge from the retrieval port in the allotted time plus 10 minutes, reverse the procedure by forcing water into retrieval port.
 - .5 Building occupants shall be notified and requested not to draw water.
- 3.3 Pigging
- .1 No pigging required, only foam swabs
- 3.4) Flushing
- .1 Flush each section of water main after swabbing is complete until the effluent is clear, and chlorine levels are down to levels acceptable to PARC staff.
- 3.5) Disinfection
- .1 Disinfect each section of the water main swabbed immediately after the swabbing to required chlorine levels.
 - .3 It is suggested that chlorine can be injected through a valve just after the domestic pumps (see photo in appendix). The flow coming out of the hydrant when two domestic pumps will have to be established to calculate the amount of chlorine to inject to ensure a minimum of 50mg/l for three hours. The contractor can use the above method, or any other method that will achieve the required chlorine levels.
- 3.6 Dechlorination
- .1 De-chlorinate the effluent during the swabbing, flushing, disinfection as per ANSI / AWWA C651-92. Test effluent



APPENDIX A

The main water line can only be shut off for a maximum of 6 hours, in any given day, for pigging, swabbing, or tank cleaning.

The shut down will be from 10:00 am to 4:00 pm on any day previously approved by PARC staff.

Coordination of Work

PARC, Agassiz staff, will do all they can to assist the contractor, but the contractor will be responsible for the coordination of the work.

The contractor will have enough staff to handle all the work required for line cleaning, valve operating and chlorination. PARC staff will turn on all small branch lines to ensure chlorine reaches all points throughout the system. PARC staff will also flush all these branch lines to get rid of the chlorine after the main line has been flushed of the high levels of chlorine.

PHOTOS OF CONNECTION POINTS AND OTHER PERTINENT ISSUES.



APPENDIX VIII

EXAMPLE OF RECORD OF CALIBRATION AND REPAIRS



Manufacturers Name, Instrument Type and Serial Number			
Date of Calibration	Type of Repair and Date	Name of Person	Comments

Note: Keep with Instrument at all times

Example:

Hach, Turbidity Meter 2500 Serial Number AS12456TM			
Date of Calibration	Type of Repair and Date	Name of Person	Comments
New Aug 18/84		R. May	
Sept 18/84		D. Miller	Routine Calibration
	New Probe Oct 10/03	T. Masich	Scheduled Replacement as per manufactures requirements

Note: Keep with Instrument at all times



APPENDIX IX

INVENTORY OF BACKFLOW PREVENTION ASSEMBLY



<i>Inventory of Backflow Prevention Assembly</i>			
Owner Information			
Location Address:		Research Centre Name or SubStation:	
Owner of Device (AAFC, Municipality, etc.):			
Custodian of Device (Please Print):		Telephone Number (include area code):	
Device Information			
Type of Device:	Model Number:	Serial Number:	Size:
Location of Assembly in Building and water use in this area:			
Hazard Level (minor, moderate, severe):			
Do you have Plan Showing Location of Devices:			
<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
Testing Information			
Name of Certified Tester (Please Print):	Tester Certification Number:	Telephone Number (include area code):	
Business Name:	Business Address:	Postal Code:	
Repair History of Device:			
Testing Frequency (initial, semi-annual, annual):			
Remarks:			
Custodian Title & Signature:			Date (Year/Month/Day):



Abbreviations

Air gap	AG
Backflow preventers:	
Double check valve assembly type	DCVA
Double check valve assembly type for fire systems	DCVAF
Single check valve assembly type for fire systems	SCVAF
Dual check valve type	DuC
Dual check valve type for fire systems	DuCF
Dual check valve type with atmospheric port	DCAP
Dual check valve type with atmospheric port for carbonators	DCAPC
Dual check valve type with intermediate vent	DuCV
Reduced pressure principle type	RP
Reduced pressure principle type for fire systems	RPF
Check valve	CV
Critical level	CL
Vacuum breakers:	
Atmospheric type	AVB
Hose connection dual check type	HCDVB
Hose connection type	HCVB
Laboratory faucet type	LFVB
Pressure type	PVB
Spill-resistant pressure type	SRPVB

RESTAURANT CAFETERIA KITCHENS

Device	Method of Containment
Booster Heater	AG on drain from relief valve
Dishwasher	AVB on supply line
Dishwasher	
Detergent Feeder	AVB on supply or connect downstream of AV on dishwasher with water supply
Dish Rinse Unit c/w Flex Hose Connection	AVB ahead of flex hose if no control valve is used on the hose. If control valve is installed on hose a DCAP or an inline AVB installed ahead of hose AVB on water supply to jet rinse.
Garbage Disposal Unit c/w Flushing Rim	AVB supply line
Hood Degreasing Equipment	AVB installed on supply line above detergent feeder
Ice Machine and Chest	AG on all drains
Salad Cooler Tables	AG on all drains
Silverware and Dish Soak Tanks	AVB must be installed above the flood level rim
Soft Drink Dispensing Equipment	AVB c/w intermediate vent



Type of Cross Connection	Degree of Hazard	Recommended Devices	Additional Area and/or Premise Isolation
Abattoirs			RP
Air Compressor Oil Cooler	Moderate	DCVA	
Animal Watering	Minor	DCAP, AVB	
Animal Watering	Moderate	AVB, PVB, DCVA	
Apartment Building (over 48 units)	Moderate		DCVA
Apartment Building (with laundry)	Moderate		DCVA
Apartment Building (over three floors)	Moderate		DCVA
Aspirator (toxic)	Severe	AVB, PVB, LFVB	RP
Aspirator (non-toxic)	Minor	AVB, LFVB	
Autoclave	Severe	AVB, PVB	RP
Autopsy & Mortuary Equipment	Severe	AVB, PVB	RP
Basin	Moderate	AG	
Bathtub with filler below flood level	Minor	DCAP, AVB	
Bottle Washer	Moderate	AG, AVB	
Car Wash	Severe		RP
Chemical Feed Tanks	Severe	AG, RP	
Chemical Plant	Severe		RP
Chiller Tanks	Severe	RP	
Chlorinator	Severe	RP	
Clothes Washer	Severe	AG, AVB	
Commercial Laundry	Severe		RP
Condensate Tank (top feed)	Moderate	AG, AVB, DCVA	
Condensate Tank (bottom feed)	Severe	RP	
Cooling Condenser (solenoid upstream)	Minor	DCAP	
Cooling Tower	Severe	RP	
Cooling Condenser (solenoid downstream)	Severe	RP	
Dairy Barn Equipment	Severe	RP	
Day Nursery	Moderate		DCVA
Deaerator (top feed)	Moderate	DCVA	
Deaerator (bottom feed)	Severe	RP	
Degreasing Equipment	Severe	RP	
Detergent Dispense	Severe	AVB	
Dishwasher (residential)	Moderate	AG	
Dish Rinse Unit c/w Flex Hose	Moderate	AG, AVB, DCAP	
Dishwasher (commercial)	Moderate	AG, AVB	
Distiller	Minor	AG	
Fire Systems (chemicals added)	Severe	RP	
Fire Systems (no chemicals added)	Moderate	DCVA	



Floor Drain c/w Flushing Rim	Severe	AG, RP	
Floor Drain Trap Primer	Severe	AG	
Flush Tanks	Moderate	AG, AVB	
Flushing Equipment Devices	Severe	AG, AVB, PVB	
Food & Beverage Processing Plant	Severe		RP
Fountain Ornamental	Moderate	AG, AVB, DCVA	
Garbage Disposal Unit	Severe	AVB, DCAP	
Garbage Can Washer	Severe	AVB, DCAP	
Heating Systems (no chemicals added)	Severe	RP, AG	



Type of Cross Connection	Degree of Hazard	Recommended Devices	Additional Area and/or Premise Isolation
Heating Systems (chemicals added)	Severe	RP, AG	
Hose Bibs	Moderate	HCVB	
Hot Tubs	Moderate	AG, AVB	
Humidifier	Moderate	AG, DCAP	
Industrial Fluid System	Severe	RP	
Irrigation System (chemical injected)	Severe	RP	
Irrigation System (no chemical added)	Moderate	AVB, PVB, DCVA	
Lab Bench Equipment (toxic)	Severe	AVB, LFVB	RP
Lab Bench Equipment (non-toxic)	Minor	AVB, LFVB	
Laboratory	Severe		RP
Laundry Machines	Moderate	AG	
Lavatory	Moderate	AG	
Meat Packing Plant	Severe		RP
Milk Processing Plant	Severe		RP
Non-Potable Water	Severe	AG, RP	RP
Ornamental Fountains	Moderate	AVB, PVB, DCVA	
Photo Lab Sinks	Severe	AG, AVB	
Pipette Washer	Severe	AG, AVB	
Pipe to Hose Bibs	Moderate	DCAP, PVB	
Piping to Hose Bibs	Moderate	DCAP	
Plants with Radio Active Material	Severe		RP
Potato Peeler	Moderate	AG, AVB	
Premises where Access is Prohibited	Severe		RP
Private Water Source	Severe	AG	
Pump Primer Line (toxic)	Severe	RP	
Pump Primer Line (non-toxic)	Moderate	DCAP, DCVA	
Research Buildings	Severe		RP
Restricted Area	Severe	RP	
Reverse Osmosis	Minor	AG (at drain)	
Sewage Treatment Plant	Severe		AG, RP
Sewage Ejectors	Severe	AG, RP	RP
Sewage Pump	Severe	AG	
Steam Generator	Moderate	DCVA	
Steam Cleaner	Moderate	DCVA	
Sterilizer (condensate cooling only)	Moderate	AVB, DCAP	
Sterilizer (connection into chamber)	Severe	RP	
Veterinary Clinic (non-operating)	Moderate		DCVA
Veterinary Clinic (operating)	Severe		RP



Vending Machine with Carbonators	Moderate	DCAP	
Vending Machines (with filters)	Moderate	DCAP	
Wash Tanks	Moderate	AVB, DCVA	
Wash Racks	Severe	RP	
Wash Tanks (toxic)	Severe	AVB, PVB, RP	
Water Closet (tank type)	Moderate	AVB	
Water Closet (flush-o-meter type)	Moderate	AVB	
X-Ray Equipment	Severe	AG, RP	



Appendix X Bottled Water Dispenser Maintenance

Bottled Water Dispenser Maintenance

Note: This information can be found on Health Canada's website at:
<http://www.hc-sc.gc.ca> "Questions and Answers on Bottled Water" (sub-heading "How do I maintain the cleanliness of a water cooler")

Cleaning your water cooler:

1. Unplug cord from electrical outlet of cooler.
2. Remove empty bottle.
3. Drain water from stainless steel reservoir(s) through faucet(s).
4. Prepare a disinfecting solution by adding one-tablespoon (15 mL) household bleach to one Imperial gallon (4.5 L) of water solution. (This solution should not contain less than 100 ppm available chlorine.) **OR** Some companies suggest using one part vinegar to three parts water solution to clean the reservoir of scale before cleaning with bleach. Check your manual.

NOTE: Other disinfecting solutions may be suitable. Please check with your water cooler supplier.

5. Wash reservoir thoroughly with bleach solution and let stand for not less than two minutes (to be effective) and not more than five minutes (to prevent corrosion).
6. Drain bleach solution from reservoir through faucet(s).
7. Rinse reservoir thoroughly with clean tap water, draining water through faucets, to remove traces of the bleach solution.

NOTE: Clean your bottled water cooler with every bottle change.

Drip Tray (located under faucets):

8. Lift off drip tray.
9. Remove the screen and wash both tray and screen in mild detergent.
10. Rinse well in clean tap water and replace on cooler.

Replacing Bottle:

1. Wash hands with soap and warm water before handling. If you choose to use clean protective gloves (ex. latex), discard or disinfect after each use and prior to reuse.

NOTE: Protective gloves should never replace proper hand washing and hygiene.

2. Wipe the top and neck of the new bottle with a paper towel dipped in household bleach solution (1 tablespoon (15 mL) of bleach, 1 gallon (4.5 L) of water). Rubbing alcohol may also be used, but must be completely evaporated before placing the bottle in the cooler
3. Remove cap from new bottle.
4. Place new bottle on cooler.

Adapted from instructions provided by Ken Orom, Calgary Board of Education, and Ken Reynolds, Calgary Health Services.

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Agriculture and Agri-Food Canada Agriculture et Agroalimentaire Canada

Appendix II Lethbridge Potable Water Quality Management Plan



Agriculture and
Agri-Food Canada

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POTABLE WATER QUALITY MANAGEMENT PROGRAM

**Lethbridge Research & Development
Centre**

**5403 1st Avenue South
Lethbridge, AB**

May 2017

BACKGROUND

In Canada, providing clean, safe and reliable drinking water that meet *Guidelines for Canadian Drinking Water Quality (GCDWQ)* is the responsibility of the provincial and territorial governments. Federal government also shares this responsibility when it supplies the drinking water to federal lands and facilities. To aide federal departments in providing safe drinking water, Health Canada has published a guidance document “the *Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction*”(GCDWQ, 2005). Agriculture and Agri-Food Canada (AAFC), as a purveyor of drinking water in departmentally owned facilities, is also obligated under the Canada Labour Code – Part II, section 125(1) (j) to provide safe drinking water to its employees. As part of meeting AAFC obligation to ensure safe drinking water is provided at AAFC facilities, AAFC has implemented a site specific Water quality Management Program based on sites’ specific requirements.

The Lethbridge Research and Development Centre (LRDC) is located approximately 1 km west of the City of Lethbridge. The centre was established around 1906 and has been in continual use for agricultural research. The site covers an area of approximately 404 hectares. The majority of the property consists of research plots used for growing crops as well as sixty eight (68) associated farm buildings, offices and research buildings. On-site buildings are predominantly located at the central and southern portion of the property as shown in the figures in appendix A. The site services approximately 400 occupants and the number increases to about 500 in the summer months. Waterlines do not enter all structures, thus only structures with a waterline are of interest to this program. The table in appendix B lists all the on-site structures. A water quality monitoring program, based on Health Canada *Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction, Version 1 (2005)*, has been on-going since 2008. However, the guidance document was updated in May 2013. The objective of this report is to update the water quality program based on the revised guidance.

Cross-Connections are physical links in the building distribution system that can potentially contaminate the plumbing system through back siphonage or backflow. Currently, there are some backflow preventers already in place in the buildings to protect the water system from mechanical equipment and laboratories. As the National Plumbing Code is the over-riding code for cross-connection control requirements, it is not encompassed as part of this water quality program. However, a cross connection control survey of the site was completed in 2011 and most of the recommendations have been implemented. The site will continue with the implementation of the remaining recommendations.

OVERVIEW OF THE SITE’S CURRENT WATER QUALITY PROGRAM

The site has been monitoring the water quality through site specific water quality monitoring program, implemented based on *Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction, Version 1 (2005)*. The site specific monitoring program involved evaluating the source of the water, microbiological parameters and chemical parameters. It is not necessary or cost



effective to sample every point-of-use location to demonstrate the quality of the water at the site, thus, the routine sampling program initiated in 2008 included microbiological sampling at ten points of use locations at the main building.

DRINKING WATER SOURCE

The entire site receives potable water from the City of Lethbridge. The research centre is serviced by the Lethbridge Water Treatment Plant which obtains its water supply from the Oldman River. The plant treats and disinfects the raw water prior to distribution in accordance with provincial and federal standards. The plant also has an on-site reservoir. The plant uses conventional treatment process consisting of a river intake, chemical coagulation, clarification, filtration and disinfection by ultraviolet (UV) light and chlorination. Chlorine and UV light is used to kill bacteria and viruses that are commonly found in surface waters such as rivers and lakes. A combination of chlorine and ammonia that forms chloramine is added before the water leaves the treatment plant to ensure an effective kill of bacteria and to provide a residual disinfectant throughout the distribution system to combat any contamination. Chloramine may have a leaching effect on lead piping; however, City of Lethbridge confirmed that the distribution system is not of lead piping. The city ensures that quality of water distributed meets or exceeds health based federal guidelines and provincial standards through rigorous testing. Annual summary of water quality results are made available to the public at the city's website (<http://www.lethbridge.ca/living-here/water-wastewater/Pages/Water.aspx>) and daily results can be obtained by directly contacting the city at H2Oinquiries@lethbridge.ca. The city also has communication protocols in place to notify consumers of unexpected events.

MICROBIOLOGICAL ANALYSIS

The most significant health risk in the drinking water supply is posed by the presence of disease-causing microorganisms. Microorganisms monitoring programs typically include E.coli and Total Coliforms. Chlorine residuals are also used as an indicator of the integrity of the water. As the general responsibility of providing drinking water lies with the provincial and territorial governments, Health Canada revised the [*Guidance for Providing Safe Drinking Water in Areas of Federal Jurisdiction, Version 2*](#) in May 2013 to address the duplication in validating water quality in federal facilities on municipal systems. The revised guidance now indicates that facilities on municipal potable water systems do not require routine microbiological sampling when municipal data is periodically assessed and reviewed, site specific concerns are managed and a plan is in place to address consumer concerns. With readily available municipal data for review and a process in place to address occupants' concerns through the facility services, it is not necessary to conduct monthly water quality monitoring at this site.

Site's sampling data from February 2009 to January 2016 were reviewed. There were 55 sampling events and each period with at least ten (10) sampling locations from the various buildings (24, 26,

60, 63, 86, 102 and 120). Once in the distribution systems, the quality of the municipal water is not anticipated to vary from building to building for microbiological parameters.

Review of the historical data revealed that only three samples from two sampling events (June 2013 and August 2013) exceeded in Total Coliforms but not in Escherichia Coli (E.Coli). Considering the remaining eight or nine samples from the same periods were within guidance, these three individual exceedances were attributed to sample contamination through human error. Subsequent samples from the same locations were within guidance limit. With the exception of these three contaminated samples, all remaining samples were within guidance limit. Thus, it is evident that the site is receiving microbiologically safe water from the municipal system.

CHEMICAL ANALYSIS

The GCDWQ lists many chemical parameters of concern. However, analyses of chemical parameters in the drinking water are based on regional geology, raw water source and activities that may impact the quality of the raw water source. As the municipality is responsible for providing safe and clean drinking water, baseline chemical analysis is conducted by the municipal water treatment facility in compliance to outlined provincial regulations. Once the water is in the distribution system, the vast majority of the chemicals remain the same as there is no potential source of contribution. As per the Health Canada guidance, baseline chemical analysis is not required for municipally supplied water, if data is available through the municipality. However, the municipality's responsibility for the quality of the water ends at the point of entry to the property. The site is responsible for any chemical parameters that may be introduced through the site's plumbing system. This eliminates AAFC's requirement to conduct analysis on all remaining chemical parameters except for infrastructure related parameters that may be contributed by the building plumbing systems. No chemical parameters were analyzed as part of the current water quality program for the site.

SAMPLING PROGRAM UPDATE

In May 2016, all structures with potable water were reviewed. Out of the 68 structures on site, 33 structures had potable water lines (see Appendix B). However, of the 33 structures five were either not in use or the work area was unsuitable for water consumptions (eg. wash hose connections for cleaning sewage) and six structures only have hose connections for cattle watering or servicing equipment. As a result, only the 22 structures with potential point-of-use water consumption locations such as drinking fountains and lunch room sinks were further assessed.

The initial sampling program for this site included only microbiological samples at the main building (building 102) as well as in building 24, 26, 60, 63, 86 and 120. The sampling was done at water consumption locations such as fountains and lunch room sinks.

No chemical parameters were assessed as part of the previous program to establish baseline. However, the result of such a test is expected to be the same as the city results. Thus, the program is concentrated on chemical parameters that would be introduced by the plumbing system. Copper, iron and lead are the common chemical parameters contributed by the plumbing system. Both copper and iron have aesthetic objectives in the GCDWQ which are based on taste and odour and do not have health related guidance. Thus, copper and iron exceedances related concerns are addressed when brought forth through the occupant complaint process.

Lead is a health based parameter and has a maximum allowable concentration (MAC) in the GCDWQ that is intended to be applied to average concentration in water consumed over extended periods. The main source of lead in drinking water is through corrosion of plumbing material with lead components, such as pipes, pipe solder, brass fixtures and fittings. However, use of lead piping has ceased in the mid 1970's and use of lead soldering ceased in the mid 1980's. The amount of lead dissolved into drinking water depends on factors such as pH, alkalinity, water temperature, water hardness, length of piping and the amount of time water is sitting in the pipes. Most lead detection tends to be limited to the immediate vicinity of old brass fixtures or fittings with lead and due to the numerous elbow joints with lead soldering which is mitigated through flushing the initial draw of water. Therefore, any building constructed or renovated with plumbing after the mid 1980's does not pose any lead concerns from the plumbing system.

In June 2016, an assessment of the site's structures was completed with respect to the presence of lead at the water consumption locations. Results of the assessment are as follows:

- Buildings 26, 76, 101, 103 and 126 either had very limited infrequent seasonal use or was not considered a suitable consumption location ie. Pesticide building. As a result, a "No Drinking" sign will be posted at these buildings, even though these buildings are supplied with city potable water.
- Buildings 116, 118, 122, 123, 124, 125, 126 and 130 have water consumption locations but were constructed after 1984, thus lead is not a concern for these buildings.
- Buildings 22, 34, 60, 86, 87, 100, 102, 118, and 120 with original construction date prior to 1984 are in frequent use by site employees. Although some renovations were completed over the years, it was determined to conduct sampling at these nine buildings with primary drinking water locations to substantiate or refute any potential lead related concern.

In September 2016, a set of sampling was conducted in these nine buildings. Details are for the buildings are provided in the table in Appendix B. Water samples were collected from buildings 22, 34, 60, 86, 87, 100, 102, 118, and 120 for lead, copper and iron in the morning following the Labor Day long weekend (September 6, 2016 at 7:00 am) to represent the longest retention time. Samples were taken at zero and five minutes at lunch room sinks and drinking fountains. The zero minute samples were taken for diagnostic purpose to identify a presence of lead related plumbing materials. The five minute flush time samples were taken for evaluation against GCDWQ criteria. With the exception of the slight aesthetic iron exceedance observed in the zero minute sample of building 22 lunch room sink, all zero and five minute samples for all buildings were well within the guidance limit. This confirms that lead is not a concern for this site.

In conclusion, microbiological and chemical parameters of interests are analyzed by the city on a regular basis thus eliminating the need for the site to continue with the monthly microbiological

analysis. Site's historical data from the past several years also supports that the site receives microbiologically safe water. No building specific parameters of concern were identified in September 2016 sampling of lead, copper and iron.

Based on the above information, the monitoring program for the LRDC has been updated as follows:

- Microbiological parameters are not a concern for the site as the municipality does daily testing. Historical data did not identify any concerns. Thus, semi-annual sampling at three point-of-use locations is considered to be sufficient water quality monitoring for the site.
- One sample should be collected from the closest location to the entry point to represent the quality of municipal water entering the property. Two other samples should be collected on a rotational basis from any of the other regularly used buildings to substantiate the quality of water within the property. Water samples should not be collected from unoccupied buildings or low occupancy buildings.
- No concerns related to building related parameters were identified for this site. Sampling for lead, copper or iron is not required. However, flushing or "No Drinking" signs should be posted in unoccupied or infrequently used buildings as a precautionary measure.
- Seasonal buildings should undergo flushing prior to the start of the season.

Summarized below is the proposed water quality monitoring program for LRDC.

LRDC - SAMPLING PROGRAM			
<ul style="list-style-type: none"> • Site is on municipal water system • Municipal water quality data are readily available on city website or upon request. • No building related parameters of concern were identified. 			
Locations		# of Samples/yr	Sampling details
22	Agronomy Service Building	6	Semi-annual microbiological samples to be taken after <u>flushing of 2 minutes</u> as follows: <ul style="list-style-type: none"> • 1 sample nearest to the point of entry. • 2 samples from any two occupied buildings.
34	Maintenance Shop		
60	Residence		
86	Dairy Barn		
87	Soil Science Service Building		
100	Individual Feed Barn		
102	Agriculture Centre		
116	Feed Mill		
118	Controlled environment Fac.		
120	Engineering Laboratory		
122	Sheep Research Facility		
125	Feedlot Barn		
126	Compost Building		
130	General Storage Facility		
Locations		Rational for No sampling	Decision
26	Seasonal Public Restrooms	Seasonal limited use	<i>These shaded buildings are to be excluded out of the sampling</i>
76	CEB Shop/Garage	Wash hoses only – limited use	
82	Bulter Storage	Limited infrequent use by 1 staff	

101	Bull Barn	Limited infrequent use by 1 staff	<i>program as "No Drinking" signs are posted in these areas.</i>
103	Treatment Barn	Limited infrequent use by 1 staff	
123	Pesticide Storage	Unsuitable drinking location	
124	Protozoa barn/ Quarantine Bar	Seasonal limited by 2 staffs	

If no consecutive exceedance is reported after three (3) years of sampling then routine sampling may be done on an annual basis.

WATER QUALITY PROGRAM IMPLEMENTATION

The water quality program is implemented with combination efforts of the facility staff and the water quality aspect lead. Aspect lead's role is limited to providing guidance to facility staff with respect to interpreting results and recommending corrective actions as required. Facility managers are responsible for making arrangements for water sample collection and ensuring site specific samples are collected and shipped to the laboratory. Facility managers are required to maintain a record of the results, disseminate or make the results available to occupants, review the results and take appropriate actions when required. Facility managers may also consult with the aspect lead when necessary.

Once results are received, facility managers should maintain a copy of the results in a central location. Results should be made available to the Occupational health and safety committee and occupants of the building. In cases of any exceedances, results sent by facility manager to the OHS committee should accompany interpretation of results with rationale for nil action or action taken. Provided in Appendix D is a table with some general results interpretation guidelines. Facility managers should consult aspect lead when uncertain in interpreting results or require additional information to address any employee or occupant complaints.

CONCLUSION

Based on site structures review, the results of the potable drinking water sampling in 2016 and historical data, the sampling program will continue to the semi-annual sampling regime. Update of the program is summarized in a point form below.

- Semi-annual microbiological sampling will continue at the centre to provide assurance to occupants. After 3 years, site will move to annual sampling.
- Plumbing related concerns were not identified for water consumption areas. However, plumbing system related concerns associated with areas of limited use have been mitigated by posting no drinking or flushing sign.

The facility manager should revisit the site sampling program as required in conjunction with water quality aspect lead when change occurs to the site's water system. As part of the Potable Water Quality Management Program, aspect lead may review the site's program in five-seven years' time as required.



Prepared By:

Sultana Molla (Aspect Lead for Water Quality)

OHS Committee Acceptance:

Tabled on April 19, 2017

Reviewed By:

Laura Lee Chomicki (Integrated Services Manager)
Donovan Casson (Facility Manager)

APPENDIX A – SITE FIGURES

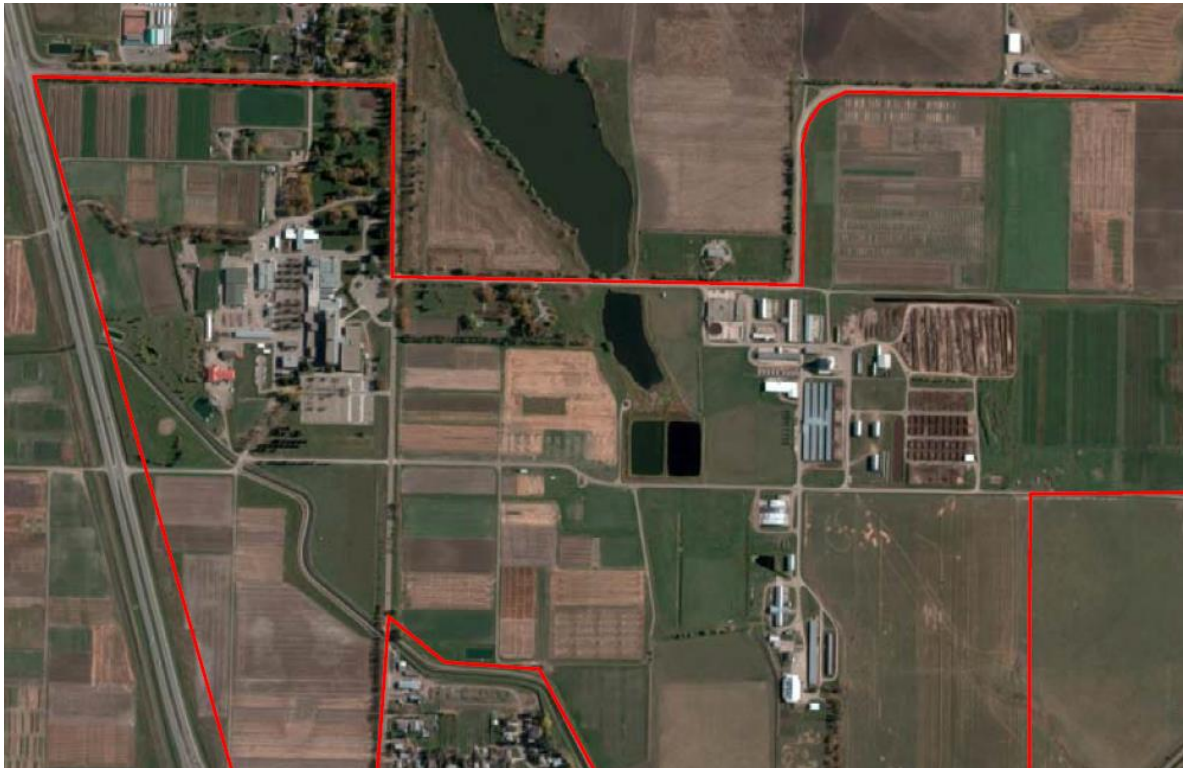


Figure 1: Site



Figure 2: Buildings in the Northern, Central and Southern Parts (to be provided after contract award)



APPENDIX B – LIST OF ALL STRUCTURE ON SITE

Lethbridge Research and Development Centre (DFRP #: 15003)

Municipality: City of Lethbridge

General Notes

1. Site is on municipal water. Historical microbiological data confirms that the site receives microbiologically safe municipal water. Thus, microbiological sampling is not a concern for this site. Water enters the property at one point and due to the high daily consumption at the main complex, there is no concern related to stagnant water or dead ends. Therefore, periodic review of municipal data is sufficient water quality monitoring for this site.
2. Lead(Pb), copper(Cu) and iron(Fe) are building related parameters that are associated with copper and iron piping and lead containing fixtures, fittings and soldering within the building's plumbing system. Copper and Iron have aesthetic objectives that are based on taste and odour whereas lead is a health based parameter. An impact of these parameters on water is dependent on the prolonged stagnation period of the water. Water samples collected following a weekend, are analyzed at zero minute flush time for diagnostic purpose as a worst case scenario and at five minute flush time for comparison to GCDWQ standards. General Health Canada guidance on handling copper, iron, and lead exceedances is flushing the system before use (<http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/lead-plomb-eng.php>).
3. Some renovations have been completed in the following buildings in the past: 22, 34, 60, 86, 87, 100, 102, 118, and 120 thus minimizing concern related to lead piping within the plumbing system.
4. Infrequently used buildings with point of use locations such as service sinks and bathroom sinks are predominantly not used as drinking water locations. These areas have potential to have stagnant water for longer period due to infrequent use and as such assurance cannot be provided for the quality of the water at the time of use. In such cases, posting "No Drinking" sign or "Drinking water reminder of flushing" signs are appropriate measure to manage these areas that have prolonged period of non-use of water.

In the table below, each building specific conclusion took into consideration building specific results, mitigation measures already in place, drinking water locations within the building, above noted general information about the site, and Health Canada guidance. The updated sampling program in section 2.4 of this report is based on the detail findings outlined in the table below and recommendations in "Building Specific Conclusion" column.



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
22	Agronomy Service Building (1955) 554.35 M ²	<p>This building has four washrooms with sinks, two showers, one lunch room kitchen sink and one drinking fountain and has undergone renovation in the past. The drinking fountain and the lunch room sink are the primary source of drinking water locations for the staff (~10 FTEs) occupying this building.</p> <p>Historically no sampling has been done at this building. On September 6th, 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the kitchen sink and the fountain. There was a slight iron exceedance at the zero minute lunch room sample but is not a concern as it is an aesthetic objective and the subsequent five minute sample was below the detection limit. Drinking fountain results for both zero and five minutes were well within guidance limit.</p>	No building specific concerns identified.
26	Public Restrooms (1976) 50.72 M ²	<p>This seasonal public washroom with four sinks and toilets, open to the public in the summer months, is serviced municipal water. Although potential for public to drink water from this location exists, due to general cleanliness and infrequent use of the facility one cannot be certain of the quality of the water at the time of use.</p> <p>Therefore, it is recommended to place a “Flushing” sign at this facility.</p>	A flushing sign should be posted to mitigate prolonged non-use.
34	Maintenance Shop (1951) 184.06 M ²	<p>This building has two washrooms with sinks, one lunch room kitchen sink, and a drinking fountain and has been renovated in the past. Primary source of drinking water for 10 FTEs in this building are the drinking fountain and lunch room sink.</p> <p>Historically no sampling has been done at this building. On September 6th, 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the kitchen sink and the fountain. All results were well within the guidance limit.</p>	No building specific concerns identified.



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
60	House Agr-S-375 (1950) 217.39 M ²	<p>This building has a kitchen sink and two washroom sinks, which have been renovated in the past. The building is rented out. The kitchen sink is considered the primary drinking water location for the occupants. The building is also occupied on weekends.</p> <p>Historically no sampling has been done at this building. On September 6th, 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the kitchen sink. All results were well within the guidance limit</p>	No building specific concerns identified.
76	Ceb Shop/Garage (1955) 167.23 M ²	There are only wash hoses in this building. The structure is permanently winterized. Staff working in this building use building 118 as their primary drinking water locations. The site is used by limited staff on an irregular basis.	Although serviced by municipal potable water, there is no accessible drinking water location. Based on the work area and devices on the hoses, the water is not used for drinking. Sampling not required in this area.
82	Bulter Storage Bldg/Parasitology (1950) 1263.48 M ²	This building has one bathroom with a sink and a work sink. The building services as storage area and is infrequently used by one staff. Although the building receives potable water, assurance of the quality of the water cannot be provided at the time of the infrequent use of the facility. The staff use building 118 as primary drinking water location. "No Drinking" sign should be posted at the two sinks.	<p>Potable water is supplied to this building. Due to the infrequent use of the facility by one staff, water quality cannot be guaranteed at the time of use. Thus,</p> <ul style="list-style-type: none"> • Post "NO DRINKING" signs at the sinks.
86	Dairy Barn (1962) 2593.39 M ²	<p>This building has two washrooms with sinks, two showers, four laboratory sinks and a drinking fountain. The building is fully occupied with roughly 8 FTEs and the drinking fountain is the primary drinking water location.</p> <p>Historically no sampling has been done at this building. On September 6th, 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the drinking fountain. All results were well within the guidance limit.</p>	No building specific concerns identified at the drinking fountain.
87	Soils Science Service Building (1961) 793.21 M ²	This building has a bathroom with a sink, a lunch room kitchen sink, a shower and a drinking fountain. The building is fully	No building specific concerns identified at the drinking fountain.



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
		<p>occupied with roughly 10 FTEs. Primary drinking water locations are the drinking fountain and the kitchen sink.</p> <p>Historically no sampling has been done at this building. On September 6th, 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the drinking fountain and the kitchen sink. All results were well within the guidance limit.</p>	
98	Lysimeter Structure (1962) 15.61 M ²	This building is serviced by municipal potable water for use in equipment. There are no point-of-use locations where one could potentially drink water. The building does not house any FTEs. Staff who use this structure rely on other areas of the farm for their drinking water locations.	No primary drinking water locations.
100	Individual Feeding Barn (1970) 5089.23	<p>This building has a bathroom with sink, one lunch room kitchen sink, and one drinking fountain. The building is fully occupied with roughly 4 FTEs. The drinking fountain and lunch room kitchen sink are the primary drinking water locations.</p> <p>Historically no sampling has been done at this building. On September 6th, 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the lunch room sink and the drinking fountain. All results were well within the guidance limit.</p>	No building specific concerns identified at the drinking fountain.
101	Bull Barn (1972) 333.34 M ²	The building has a washroom with a sink and a laboratory sink. It is occasionally used by two FTEs. Although the building receives potable water, the quality of the water at the time of use cannot be assured due to the infrequent limited use of the facility. This building was not included in the September 2016 sampling because in consultation with site staff, a decision was made to post a no drinking sign.	<p>Potable water is supplied to this building. Due to the infrequent use of the facility by one staff, water quality cannot be guaranteed at the time of use. Thus,</p> <ul style="list-style-type: none"> • Post “NO DRINKING” signs at the sinks.
102	Agriculture Centre (1977) 32584.7 M ²	This main lab complex is occupied by majority of the FTEs (300 - 500) working at the site. There are over 20 washrooms with sinks, ten showers, many laboratory sinks, janitorial sinks, cafeteria sinks, wash sinks and drinking fountains.	No building specific concerns identified for this building.



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
		Historically no chemical sampling has been done and with high occupancy, the building is not anticipated to have any concerns. On September 6 th , 2016, sampling was conducted for metals including lead, copper and iron at zero and five minutes at the lunch room sink. The sample was also analyzed for all chemical parameters. All results were well within the guidance limit.	
103	Treatment Barn (1972) 172.8 M ²	This building has one work sink and is infrequently used by one staff member. Although the building receives potable water, the quality of the water at the time of use cannot be assured due to the infrequent limited use of the facility. Staff working in this area uses building 118 as their primary drinking water location. This building was not included in the September 2016 sampling because in consultation with site staff, a decision was made to post a no drinking signs at the two sinks.	Potable water is supplied to this building. Due to the infrequent use of the facility by one staff, water quality cannot be guaranteed at the time of use. Thus in consultation with site staff, it is recommended that: <ul style="list-style-type: none"> • Post “NO DRINKING” signs at the sinks.
116	Feed Mill (1984) 923.76 M ²	This building has a washroom and a drinking fountain and is frequently used by regularly by couple of staff. No sampling was required as the building was constructed subsequent to 1980 and is not expected to have any building related parameter of concerns.	No building specific concerns at this building.
118	Controlled Environment Fac. (1985) 1548.16 M ²	This building has two washrooms with sinks, one lunch room sink, and a fountain. The building is fully occupied with roughly 3 FTEs. The drinking fountain and lunch room kitchen sink are the primary drinking water locations. Historically no chemical sampling has been done at this building. On September 6 th , 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the lunch room sink and the drinking fountain. All results were well within the guidance limit.	No building specific concerns at this building.
120	Engineering Laboratory (Power House) (1974) 1634.82 M ²	This building has one washroom with sinks, one lunch room sink, and a fountain. The building is fully occupied with roughly 4 FTEs. The drinking fountain and lunch room kitchen sink are the primary drinking water locations.	No building specific concerns at this building.



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
		Historically no chemical sampling has been done at this building. On September 6 th , 2016, sampling was conducted for lead, copper and iron at zero and five minutes at the lunch room sink and the drinking fountain. All results were well within the guidance limit.	
122	Sheep Research Facility (1992) 1306.5 M ²	This building has two washrooms with sinks and one lab sink. One person regularly uses this building. Staff working in this building uses the building 100 lunch room as their primary drinking water location. Based on the construction date, the building is not expected to have any lead concerns. Thus, it was not included in the 2016 sampling.	No building specific concerns at this building.
123	Pesticide Storage (1991) 181 M ²	The building has a lab sink and two staff uses the facility during the summer months. The building is used for pesticide mixing preparation and storage. The building receives potable water, however due to the nature of the work area; potential for contamination exists from the chemical mixing. In consultation with staff and with available drinking water locations in the next building, this building was not included in the September 2016 sampling and a decision to post a no drinking sign was agreed upon.	Potable water is supplied to this building. Due to the nature of the work area, it is not a suitable drinking water location. Thus, <ul style="list-style-type: none"> • Post “NO DRINKING” signs at the sink.
124	Protozoa Barn/Quarantine Bar (1994) 223 M ²	The building has lab sinks and two staff uses the facility during the summer months. Staff working in this building uses the building 118 lunch room as their primary drinking water location. Based on the construction date, the building is not expected to have any lead concerns. Thus, it was not included in the 2016 sampling.	No building specific concerns at this building.
125	Feedlot Barn (1997) 197.52 M ²	The building has one washroom with sinks and one lab sink and two staff use the building on a regular basis. Based on the construction date, the building is not expected to have any lead concerns. Thus, it was not included in the 2016 sampling.	No building specific concerns identified.
126	Compost Building (1998) 131 M ²	The building has one washroom with a sink and one work sink that are used regularly by couple of staff. No sampling was required as the building was constructed subsequent to 1980 and	No building specific concerns identified.



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
		is not expected to have any building related parameter of concerns.	
130	General Storage Facility (2000) 2852.9 M ²	The building has 2 washrooms with sinks and one fountain. The drinking fountain is the primary source of drinking water locations for the staff (~10 FTEs) occupying this building. No sampling was required as the building was constructed subsequent to 1980 and is not expected to have any building related parameter of concerns.	No building specific concerns identified.
6	Residence Agr-Ef-225 (1948) 165.92 M ²	Not Applicable - Not occupied and condemned	
19	Plant Science Field Building (1949) 205.13 M ²	Not Applicable - No water	
20	Garage (1928) 356.75 M ²	Not Applicable - No water	
36	Loose Housing Barn (1950) 556.94 M ²	Not Applicable - No water	
37	Sheep Barn (1950) 1114.84 M ²	Not Applicable - No water	
38	Beef Barn (1950) 735.79 M ²	Not Applicable - Cattle Pens use and Storage facility - used only for cattle watering.	
42	Sheep Barn (1952) 212.56 M ²	Not Applicable - No water	
44	Poly Greenhouse	Not Applicable - Just hoses for watering plants and does not house any FTEs	
48	Gas Regulator House (1947) 12.26 M ²	Not Applicable - No water	
50	Fertilizer Storage Shed (1948) 26.2 M ²	Not Applicable - No water	
51	Dry Stock Barn (1958) 588.63 M ²	Not Applicable - Cattle Pens use and Storage facility - used only for cattle watering.	
52	General Storage Building (1959) 5760 M ²	Not Applicable - No water	



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
53	Hay Storage Bldg. (1959) 371.61 M ²	Not Applicable - No water	
54	General Storage Building (1958) 167.23 M ²	Not Applicable - No water	
59	House Agr-S-372 (1950) 342.63 M ²	Not Applicable - Unoccupied and condemned	
61	House Agr-S-374 (1950) 217.39 M ²	Not Applicable - Unoccupied and condemned	
62	House Agr-S-373 (1950) 195.1 M ²	Not Applicable - Unoccupied and condemned	
63	House Agr-S-376 (1950) 181.16 M ²	Not Applicable - Unoccupied and condemned	
65	General Storage Building (1957) 59.46 M ²	Not Applicable - No water	
77	Scale House (1940) 16.07 M ²	Not Applicable - No water	
80	Hay Storage Bldg (1957) 362.32 M ²	Not Applicable - No water	
81	Metabolism Barn (1940) 91.42 M ²	Not Applicable - No water	
88	Sewage Lift Station No. 1 (1961) 29.26 M ²	Not Applicable - Wash hose for sewage handling	
89	Sewage Lift Station No. 2. (1961) 29.26 M ²	Not Applicable - Wash hose for sewage handling	
92	General Storage Shed (1910) 8.92 M ²	Not Applicable - No water	
97	Drainage Sump House (1962) 5.95 M ²	Not Applicable - No water	
104	Plot Shelter (1965) 98.1 M ²	Not Applicable - No water	
105	Lift Sewage Station #3 (1976) 171.3 M ²	Not Applicable - Wash hose for sewage handling	



Bldg #	Name (Original Const. date) Area (m ²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
106	Irrigation Pumphouse #1 (1975) 6.68 M ²	Not Applicable - No water	
107	Cylinder Storage (1979) 13.37 M ²	Not Applicable - No water	
108	Irrigation Pumphouse #2 (1974) 6.68 M ²	Not Applicable - No water	
109	Sheep Pens (1980) 187.28 M ²	Not Applicable - No water	
110	Machine Storage - Fairfield (1983) 557.4 M ²	Not Applicable - No water	
111	Hay Storage Building (1983) 267.6 M ²	Not Applicable - No water	
112	Hay Storage Building (1983) 267.6 M ²	Not Applicable - No water	
113	Hay Storage Building (1983) 267.6 M ²	Not Applicable - No water	
114	Irrigation Pump House #3 (1984) 6.68 M ²	Not Applicable - No water	
115	Bee Keeping Storage Shed (1985) 35.7 M ²	Not Applicable - No water	
117	Irrigation Pump House #4 (1989) 6.68 M ²	Not Applicable - No water	
119	Sheltered Corral (1985) 2427.8 M ²	Not Applicable - No water	
121	Picnic Shelter (1986) 33.64 M ²	Not Applicable - No water	
127	Compost Shelter (1998) 657.73 M ²	Not Applicable - No water	
128	Irrigation Pumphouse #5 (1999) 10 M ²	Not Applicable - No water	
129	Pump Shack Irrigation (Fairfield Site) (1999) 11.15 M ²	Not Applicable - No water	



Bldg #	Name (Original Const. date) Area (m²)	Building Specific Observation and details related building related parameters	Rational for Building Specific Conclusion (Parameter - Lead (Pb))
099A	Plot Storage A (1966) 115.94 M ²	Not Applicable - No water	
099B	Plot Storage B (1966) 115.94 M ²	Not Applicable - No water	

APPENDIX C – SIGNS

Flushing Sign: The sign is to be issued when water system is known or suspected to be contaminated with contaminants that can be reduced or removed by flushing the system. Older buildings (for example - constructed prior to 1965) may have materials in soldering of pipes, brass fixtures or fittings that could increase metals into the water especially if there is a low water usage or extended period of non-use. Flushing removes such impacted water.

Drinking Water Reminder

Flush to remove stagnant water following a period of limited use or non-use.

Prior to **drinking**:

- Run water for five (5) minutes when the water has not been in use.
- Run water for about a minute when the water has been in use.

Generally for public washrooms with limited use and due to general sanitation concern, a flushing sign is always recommended.

Do not drink Sign: The sign is to be issued when water system is known or suspected to be contaminated with:

- faecal pollution indicator such as E.coli or any form of disease-causing organisms;
- chemical contaminants with health based guidance that cannot be removed or reduced to acceptable levels through flushing or filtration; or
- as determined by water quality aspect lead.

This sign is also used when:

- alternative drinking water locations are available and lead exceedance is observed at the zero minute washroom samples. In such cases, a no drinking sign is used instead of a flushing to conserve water.





APPENDIX D – SAMPLING DETAILS

Research Centre	Lethbridge Research & Development Centre	Laboratory for Water Quality Analysis
Facility	Lethbridge, AB	
Water System Manager	Laura Lee Chomicki	
Water System Operator	Donovan Casson	
Water Source	Municipal System	
Water System	Lethbridge Research & Development Centre	

Microbiological: Remove tap screens, let water run 2 minute and then collect sample				
Building Name	Sampling Point location	No. of Sample	Sampling Point Type	Sampling Point Comments
120	Engineering Laboratory	2/year	Point of Entry	<ul style="list-style-type: none"> Collect 1 sample at spring. Collect 1 sample at fall.
22	Agronomy Service Building	4/year	Furthest to Entry Point	<ul style="list-style-type: none"> Collect 2 samples any of these building at spring and fall Rotate sampling within the buildings
34	Maintenance Shop			
60	Residence			
86	Dairy Barn			
87	Soil Science Service Building			
100	Individual Feed Barn			
102	Agriculture Centre			
118	Controlled environment Fac.			
122	Sheep Research Facility			
125	Feedlot Barn			
126	Compost Building			
130	General Storage Facility			
26	Seasonal Public Restrooms	<p><i>Signs posted in these buildings due to low usage or unsuitable drinking water locations</i></p>		
76	CEB Shop/Garage			
82	Bulter Storage			
101	Bull Barn			
103	Treatment Barn			
123	Pesticide Storage			
124	Protozoa barn/ Quarantine Bar			



APPENDIX E – GENERAL RESPONSE GUIDANCE TO EXCEEDANCES

Provide below is a general response guidance for Facility managers. Facility manager should consult with tact aspect lead for complex issues.

General Response Guidance to Exceedances	
E. Coli Microbiological Health Concern MAC level – 0 count	<ul style="list-style-type: none"> • Post “No Drinking Sign” • Immediate resample. • Remove sign after receiving acceptable results • Consult aspect lead if problem is system wide or persists.
Total Coliform Microbiological Water quality Indicator MAC level – 0 count	<ul style="list-style-type: none"> • No sign posting required • Resample • 2 consecutive exceedances will require “No drinking” sign posting and shocking the system. • Consult aspect lead if problem is system wide or persists.
HPC – Heterotopic Plate Count Microbiological Water quality Indicator level – None (naturally occurring)	<ul style="list-style-type: none"> • No sign posting required • Resample if count is drastically high from previous results –otherwise no action required. • 2 consecutive single high exceedances will require shocking the system and investigation of source if count is drastically high. • If more than one sample within the same site have the same drastically high number then shock the system before resampling.
Lead Chemical Health Concern for consumed over extended periods MAC Level – 0.010 mg/L	<ul style="list-style-type: none"> • At 0 min, exceedance is an indicator – no resampling required. If exceedance is frequent then post flushing sign. • At 5 min, exceedance is compared to GCDWQ. Post no drinking signs flush the area and then resample. If resampling results exceeds then flush entire system and resample. If exceedance persists, then maintain no drinking signs; provide lead reduction filters at drinking water locations. • Consult with aspect lead as required.
Fe/Cu Chemical Aesthetic Objectives Cu AO Level <= 1.0 mg/L Fe AO Level <= 0.3 mg/L	<ul style="list-style-type: none"> • For aesthetic objective exceedances, flush the area and resample. No posting of sign required. • Persistent exceedances will require investigation and source identification. Regular filters may be used in the interim to resolve complaint. No sign posting required as these are not health concerns.
Other parameters Chemical Aesthetic Objectives	<ul style="list-style-type: none"> • Chemical parameters with aesthetic objectives do not require posting of signs as these are not health concerns. Flushing the area and resampling will resolve most issues. • Persistent exceedances will require investigation and source identification. Filters may also be used in the interim to resolve complaint.



<p>Other Chemical parameters Health Concern MAC Levels – mg/L</p>	<ul style="list-style-type: none">• Compare chemical parameters with MAC levels to GCDWQ limits. Based on GCDWQ information, the risk factors and proper course of action must be determined.• Persistent exceedance will require investigation and source identification.• Consult with aspect lead as required.
<p>Chlorine Residual Reading Indicative Parameters Acceptable range 0.04 -0.8 mg/L</p>	<ul style="list-style-type: none">• Indicative of Secondary Disinfection in the system.• Typical levels of free chlorine in Canadian drinking water systems range are as follows:<ul style="list-style-type: none">○ 0.4 mg/L to 2.0 mg/L - leaving treatment system○ 0.4 mg/L to 1.2 mg/L - within the distribution system○ 0.04 mg/L to 0.8 mg/L - far end of the distribution system• Compare the chlorine reading at each event across the site as results should be around the same range.• If results are consistently at or below the minimum level, then assess the followings:<ul style="list-style-type: none">○ Dead end lines with stagnant water will have low reading.○ Pipes with build-ups with show high TC and HPC.• For dead-end lines, implement a flushing regime for that area• With High TC or HPC count, flush the entire pipe and resample.• Persistent low level reading will require investigation and source identification. Consult with aspect lead as required.