

APPENDIX C – TERMS OF REFERENCE FOR A RE-ASSESSMENT OF A PUBLIC WATER SYSTEM

TERMS OF REFERENCE

FOR A

RE-ASSESSMENT

OF A PUBLIC WATER SYSTEM

(Second and Future Round Assessments)

Prepared By: Office of Drinking Water
Date Prepared: October 2012

TERMS OF REFERENCE FOR A RE-ASSESSMENT OF A PUBLIC WATER SYSTEM

October 2012

1.0 DEFINITIONS

The following definitions apply throughout this document:

AWWA – means the “American Water Works Association” and its associated Standards, Manuals, White Papers and Policies.

DWO – means the regional “Drinking Water Officer” with regulatory responsibility for the Public Water System.

The DWSA – means *The Drinking Water Safety Act* assented to August 9, 2002, and as amended from time to time.

Engineer – means a Professional Engineer as defined in *The Engineering and Geoscientific Professions Act* and who;

(a) is competent by virtue of training, and experience in engineering relating to drinking water supplies, to engage in practices that fulfil the requirements of these Terms of Reference, and

(b) is not an employee of the Owner of the Public Water System being reviewed, and

(c) has been engaged by the Owner of the Public Water System to complete a Re-Assessment of the Public Water System in accordance with these Terms of Reference to assess the current condition of the System and determine its ability to meet provincial standards and industry best practices, and to provide recommendations on infrastructure related upgrades required to improve the safety and reliability of the System.

GCDWQ – means the latest version of the *Guidelines for Canadian Drinking Water Quality*.

GUDI – means a groundwater supply that due to its location, construction or condition is vulnerable to microbial contamination by surface water or run-off and has been deemed to be “groundwater under the direct influence of surface water” as per Section 2 of the Drinking Water Safety Regulation MR 40/2007.

ODW – means the “Office of Drinking Water”.

Owner – means the Owner of the Public Water System and includes Operators.

PWS – means a “Public Water System”.

Re-assessment – means the process of completing a second or future round assessment of a Public Water System to fulfil the requirement for an “Assessment of Water System Infrastructure and Water Supply Sources” referenced in Section 9 of *The Drinking Water Safety Act*.

Report – means the written report submitted to fulfil the requirement for an “Assessment of Water System Infrastructure and Water Supply Sources” referenced in Section 9 of *The Drinking Water Safety Act* and the deliverable product of these Terms of Reference.

System – the Public Water System for which the Re-assessment is being conducted.

Ten State Standards – means the latest version of the “Recommended Standards for Water Works” as issued by the ‘Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers’.

2.0 OBJECTIVES

These Terms of Reference have been prepared in support of Section 9, ASSESSMENTS OF WATER SYSTEM INFRASTRUCTURE AND WATER SUPPLY SOURCES, of *The DWSA* for re-assessments of PWSs. As required by Section 37 of the Drinking Water Safety Regulation MR 40/2007 or through Subsection 9(2) of *The DWSA*, a Re-assessment of a PWS must be completed by a Professional Engineer authorized to practice and consult in the Province of Manitoba, with applicable experience relating to drinking water systems.

A Re-assessment involves a periodic source-to-tap review of the safety and reliability of a PWS to determine whether its source, facilities and equipment are effective in producing safe drinking water and meeting the regulations in force under *The DWSA*. The Re-assessment process is designed to identify water system deficiencies and limitations, and provide Owners with recommendations on addressing these deficiencies and limitations. The level of effort for the Re-Assessment and level of detail of the Report should reflect water system size, complexity and potential risks. *The DWSA* established a PWS re-assessment frequency of once every five years.

The Owner has been notified of their Re-assessment deadline typically through their Operating Licence. If unexpected or uncontrollable delays related to financing or scheduling the Re-assessment will result in the Report being submitted more than three months late, the Owner is responsible for ensuring an extension is requested from the Approvals Unit of the ODW. The request must include the reason(s) an extension is required and the anticipated date of completion of the Report. Where major upgrading is planned, the Owner should contact the Approvals Unit to discuss scheduling the Re-assessment. Options include having the Re-assessment completed as part of pre-design work, or after a year of operation to allow evaluation of the new works.

For regional water systems where a central system provides treated water to several satellite storage, pumping or distribution systems with different Owners, a Re-assessment is required for each licensed PWS; however, it may be advantageous for Owners to collaborate on the Re-assessment and the production of a single, combined Report. Similarly, if an Owner has several licensed PWSs relying on the same water source with similar treatment systems, a single Report can be prepared. For coordinated Re-assessments and Reports, the Owner and Engineer must ensure that the condition and capabilities of each licensed system are assessed as per these Terms of Reference. Re-assessment deadlines will likely vary for the individual systems and should be considered in planning Re-assessment activities.

3.0 GENERAL REQUIREMENTS

The Re-Assessment and the Report must be completed under the general supervision of an Engineer. Detailed work may, at the discretion of the Engineer, be performed by subordinate staff such as a Certified Engineering Technologist (C.E.T.) with sufficient training and experience; however, the Engineer must review, seal and sign the final Report. (Note: in subsequent Sections, reference to the "Engineer" shall mean the Professional Engineer in overall charge of the Report or delegated subordinate staff as discussed above and appropriate to the context of the reference.)

In performing the Re-assessment, the Engineer should try, as much as possible, to obtain the required information in the form of hard copy or electronic records from the Owner. Owners receive copies of all water quality analysis reports, audits and other compliance information collected and issued by the ODW, and should be maintaining records. Preparation of a checklist by the Engineer to send to the Owner listing the required records may reduce the time spent gathering materials and help reduce the cost of the assessment. The Owner can contact the DWO for assistance in collecting water system records where required.

In drafting the Report, the Engineer should state the findings as briefly and succinctly as possible. Extensive explanation of water chemistry or process theory is not required except to support recommendations for upgrading or operational changes (ex: process optimization). Point form notes and tables should be used whenever possible to summarize information. Data should be reported in metric (SI) units.

All relevant Terms of Reference topics must be addressed given a water system's source and infrastructure. For example, if the System receives treated water and simply re-distributes it, only regulatory requirements and industry best practices applicable to distribution systems and only the infrastructure under their responsibility need to be assessed. If information is not available for a required topic, the Engineer must note this.

The Owner or the Engineer can contact the Approvals Unit at any time during the Re-assessment for advice or clarification on the process. The Engineer is expected to conduct the following steps as part of a PWS Re-assessment and summarize the results of these efforts in the Report.

3.1 Records Review

The Owner is expected to provide the Engineer with the following water system records including:

- Current Operating Licence
- Most recent PWS assessment report and ODW response
- Action Plan developed from the last assessment, if available
- Other water system reports or studies conducted since the last assessment
- Most recent PWS Annual Report for systems serving 1000 or more persons
- Annual Audits issued by the DWO since the last assessment
- Most recent inspection letter issued by the ODW
- Bacterial summary since the last assessment (available from the DWO by Owner request)
- Laboratory chemical water quality analysis reports since the last assessment
- Compliance Plan, if applicable, and ODW response, if available

3.2 Interview with the Owner

The Engineer must interview the Owner of the System. The Engineer should focus on the following topics to assist in determining the need for a site inspection and to identify Owner concerns:

- Determining if any major changes, expansion or upgrading have occurred since the last assessment.
- Determining if any significant deterioration in the physical condition or reliability of water system components has taken place since the last assessment.
- Identifying any plans for major changes, expansion or upgrading that should be considered in assessing the safety, capacity and reliability of the System.
- Identifying the current status of Compliance Plan and Action Plan items, if applicable, and the extent to which items have been, or are being, addressed.
- Recording any difficulties or concerns with the condition, design, operation and maintenance of the System, and its ability to comply with regulatory requirements including conditions of the Operating Licence and intentions of the Compliance Plan and the Action Plan, if applicable.

3.3 Interview with the DWO

The Engineer must contact the DWO to discuss any concerns about the System. The Engineer should discuss concerns raised in the Annual Audits and inspections as well as any other concerns about the condition, design, operation or monitoring of the System. The Engineer should focus on identifying outstanding items which constitute potential risks to the safety and reliability of the System.

3.4 Site Inspection

For the first round assessment, a site inspection by the Engineer was required. For second and subsequent Re-assessments and Reports, a site inspection is optional. In deciding whether to perform a site inspection, the Engineer should consider:

- The size and complexity of the System.
- His/her ability to understand the System solely from the available reports and information with sufficient confidence to seal and sign the final report.
- The extent of infrastructure changes or deterioration which may have taken place since the last assessment and the degree to which those changes may have affected the ability of the System to produce or distribute safe water.

If a site inspection is not performed, the Engineer should briefly summarize the reasons for this decision. If the Engineer decides a site inspection is necessary, this work may be delegated to suitably qualified staff. During an inspection, digital photographs should be taken of water supply, treatment, storage and distribution components, labelled and included in an appendix in a source-to-tap order. Preparing an inspection checklist may be helpful. Resources include: the CCME *From Source-to-Tap* technical guidance manual, and US EPA Sanitary Survey guidance manuals for groundwater and surface water/GUDI sources.

4.0 REPORT CONTENTS

In general, the Report must include the following sections:

1. Water System Description
2. Review of Water System Records
 - 1) Operating Licence Conditions
 - 2) Previous Assessment and Follow-up Actions
 - 3) Annual Audits and Inspections
 - 4) Other Studies or Reports
 - 5) Water Quality Data
3. Owner and DWO Concerns
4. Site Inspection Findings (if performed)
5. Ability to Meet Regulatory Requirements
6. Ability to Meet Industry Best Practices
7. Ability to Meet Demands
8. Recommended Upgrades and Actions
9. Opinion of Probable Cost (optional)

Appendices

The following items do not have to be included in the Re-assessment and the Report:

- Detailed review of bacterial laboratory analysis records, monthly disinfection and turbidity monitoring reports, and other routine operational records (reviews are completed by the DWO for the Annual Audits).
- Review of Emergency Response Plans.
- Review of facility classification and operator certification requirements.
- Review of Water Rights, Environment Act or other licences, except where significant system expansion is planned over the next five years and licence limits may apply.

A sample Table of Contents, along with explanatory notes, is provided to identify the expected format and discussion topics which must be addressed in the Re-assessment and the Report. The Engineer is asked to follow this sample Table of Contents as closely as reasonably possible for the following reasons:

- It provides a standardized format for organizing the Re-assessment activities and preparing the Report.
- It acts as a checklist to ensure all essential topics are addressed.
- It acts as a standard format from one assessment to another, thereby allowing the preparation and review processes to proceed more smoothly, quickly and economically.

5.0 PREPARATION AND SUBMISSION OF THE REPORT

The Owner is responsible for ensuring that the Re-assessment is performed, and the Report is prepared and submitted to the ODW. Upon completing a draft version of the Report, the Engineer submits the document to the Owner for review as per their instructions. The Owner is expected to review the Report and identify any significant errors or omissions. Once the Report has been finalized, the following steps shall be taken by the Owner and the Engineer:

- The Engineer completes Part ODW-AF-01B of the Form "Notice of Completion of a Re-assessment of a Public Water System".
- The Engineer provides a minimum of four (4) paper copies and an electronic copy in pdf format to the Owner with a cover letter reminding the Owner of their responsibilities for submitting the Report.
- The Owner completes Part ODW-AF-01A of the Form in two (2) paper copies of the Report.
- The Owner submits the two (2) signed paper copies and an electronic copy in Adobe Acrobat pdf format on CD to the Approvals Unit, Office of Drinking Water (1007 Century Street, Winnipeg MB R3H 0W4) or to their DWO.

6.0 FOLLOW-UP ACTIONS

The Owner is encouraged to develop and implement a prioritized plan for addressing the Report recommendations to improve the safety and reliability of their water system. Major alterations require ODW approval (ex: a Permit). The ODW can be contacted by the Owner or the Engineer to discuss upgrading plans. Submission of a formal Action Plan to the ODW is not a requirement of the Re-assessment; however, the ODW may request an update from the Owner on actions taken to address the recommendations, particularly where critical deficiencies were identified.

SAMPLE REPORT TABLE OF CONTENTS

1.0 WATER SYSTEM DESCRIPTION

1.1 GENERAL SYSTEM CHARACTERISTICS

Summarize **basic water system characteristics** including:

- Year system began operating
- Type of source (groundwater, potential GUDI, GUDI, surface water), name of source if applicable (ex: Lake Winnipeg, Winkler Aquifer)
- Operating season (year round, seasonal), typical operating season if seasonal
- Population served, for seasonal systems provide average and peak day populations
- Total number of service connections and types of connections (ex: residential, commercial, industrial, institutional, cottage, RV, standpipes, central washroom)
- Current average day demand (ADD), maximum or peak day demand (MDD), peak hourly flow and per capita/site water use (if meter records are not available, industry water consumption and peaking factors should be applied)
- Whether the system is operating under an advisory and the type of advisory (ex: Boil Water Advisory or Water Quality Advisory)

For all water system components discussed in the next subsections, note their approximate age and expected remaining life, and whether any major changes, upgrades or expansions have been made since the last assessment.

1.2 WATER SOURCE

For a **groundwater/GUDI supply** provide: number and general location of the wells relative to the water treatment plant; a summary of well construction details for each well (diameter, casing depth, type(s) of soil overburden); whether the source has been designated GUDI or potentially GUDI by the ODW; any obvious sources of contamination within 100m of the wells (ex: abandoned wells, septic fields, agricultural operations).

For a **surface water supply** describe: the intake location and design, general use of the source near the intake, any known sources of contamination within 300m of the intake (ex: wastewater discharges, waterfront cottage development, agricultural operations).

For **all water sources** describe: how water is transferred to the water treatment plant, water supply capacity or licence limits, raw water pumping capacity, raw water pipelines (pipe length, type and pressure rating), source water protection measures (ex: fencing).

For a **satellite or consecutive system** provide: the name of the PWS that supplies the treated water, the location and description of the connection.

1.3 WATER TREATMENT SYSTEM (including rechlorination)

Provide a schematic of the water treatment process showing all unit processes, valves, sampling taps, chemical injection points and on-line instruments and briefly describe process flow. Provide the design capacity as a flow rate and as a percentage of current MDD, and the number of hours per day the treatment system operates.

Describe overall treatment objectives including design-related process guarantees or goals if available (i.e., what was the treatment system designed to address).

For **each major unit process**, provide the purpose/target parameter(s), level of process redundancy, key design and operating parameters as noted below:

- *Rapid mix: type (ex: in-line mixer, basin); basin volume, dimensions and retention time (if applicable)*
- *Flocculation: number of stages, whether mixing speeds are adjustable; basin volume, dimensions and retention time*
- *Clarification: flow orientation (ex: upflow); basin volume, dimensions, retention time and overflow rate; settling enhancement provisions (ex: plate or tube settlers, sludge blanket)*
- *Media filter: type (ex: pressure, slow sand, rapid multi-media), media types and depths, filtration rate, backwash rate, backwash control and set-points where applicable (ex: manual, timed, pressure, NTU), backwash frequency, source of backwash water, filter-to-waste control and set-points/triggers where applicable (ex: manual, timed, NTU)*
- *GAC adsorption filter: type of GAC, date GAC last replaced, empty bed contact time, backwash rate, backwash control and set-points where applicable (ex: manual, timed, pressure), backwash frequency, source of backwash water*
- *Cartridge filter: micron rating (μm nominal or absolute), capacity, set-point/trigger for change-out, change-out frequency*
- *Membrane: type (MF, UF, NF, RO), membrane material, flux rate and transmembrane pressure, removal rate(s) for target parameter(s) and/or rated pathogen log removal (%); recovery rate (%); type, frequency and response for direct integrity testing, if applicable; if blending, current and maximum blending rate or ratio (ex: 80% RO, 20% greensand bypass); frequency and type of cleaning including cleaning chemicals and ability to clean separate stages/modules*
- *Air stripper: type (ex: packed tower), air-to-water ratio, rated capacity, off-gas venting*
- *Ion exchange: type (ex: strong base anion), rated capacity, regenerant, regeneration frequency*
- *Chemical feed: name of chemical, dosage in mg/L (typical, range), pump control (manual, flow-paced, feedback), trigger for changing feed rate, if intermittent application indicate trigger for initiating feed (ex: > 50 NTU), spill containment provisions, confirmation of NSF certification*
- *Ultraviolet light (UV) disinfection unit: model name, number of units, flow configuration, rated capacity, minimum UV dose and UVT to claim required or desired inactivation credit, method of dosage control and set-points (UV intensity, calculated dose), confirmation of NSF 55A or USEPA UVDGM validation*

List all on-line instruments with their location, use, and control or alarm set-points if applicable (ex: flow meters, turbidimeters, chlorine analyzers, pressure sensors, level sensors). List all bench-scale or portable test kits (type, model, parameters measured).

Briefly describe the methods of sanitary/domestic, process and floor drainage wastewater management for the water system buildings.

1.4 TREATED WATER STORAGE (including satellite reservoirs)

Describe the treated water storage components including: reservoir or tank material, location, dimensions, total volume, effective volume (at normal low operating level), level control provisions, inlet and outlet configuration; degree of baffling; flow configuration, if multiple tanks or cells; access/inspection provisions (ex: curbed hatch), other appurtenances (ex: screened vent, drain, pressure relief valve), provisions to isolate for maintenance. Note whether fire protection storage is provided.

Estimate water residence time under ADD and peak hourly flow rates (with and without fire flow). Note storage volume as a function of ADD (%).

For underground reservoirs, indicate whether any non-potable piping passes above or through the reservoir, and containment provisions.

1.5 DISTRIBUTION

Describe the distribution pumping components including: type and location of distribution and standby pumps, total and firm pumping capacities, pump control, and distribution pressure setting. For fuel-driven pumps, note fuel type and spill containment measures.

Indicate normal pressure ranges within the distribution system.

Describe any bulk fills (ex: truck fill, pail fill) connected to the system. Identify the means of backflow prevention.

Summarize general distribution system characteristics including: water loss (%) if available, general types and sizes of watermains, typical separation between watermains and sewer mains, number or location of isolation valves and hydrants/flush-outs, extent of looping versus dead ends, degree of water metering, presence of high risk water use facilities where backflow should be considered (ex: livestock operations, wastewater facilities), and the estimated percentage or number of lead service connections.

Identify any other special installations such as underground valve chambers noting flooding potential and drainage provisions.

If system includes satellite reservoirs or pumping stations, describe these components as noted above for treated water storage and distribution pumping.

1.6 OPERATION AND CONTROL

Describe the control system including: sequencing of water supply, treatment and distribution operations, methods of process and pump control, level of automation, major alarms, and alarm enunciation method.

Provide the number of operators and an estimate of the number of hours per day required for operation and maintenance.

Note whether up-to-date water system drawings, records and O&M manuals are maintained. List any established O&M programs or procedures such as watermain renewal, watermain repair, cross connection control, leak detection or instrument calibration.

Note any standby power generation equipment along with its location, ability to run all or some of the equipment, and fuel containment if located above a reservoir.

Describe any bypass that would allow raw or partially treated water to enter the distribution system. Identify any piping cross connections within the water treatment plant and the method of backflow prevention.

Briefly describe how annual O&M costs and capital upgrades are funded.

2.0 REVIEW OF WATER SYSTEM RECORDS

Review of water system records should focus on identifying infrastructure, process, treatment or equipment related deficiencies as opposed to comments on basic operational tasks such as submitting samples that are addressed in ODW Annual Audit reports. The review should typically be limited to records generated since the last assessment.

2.1 OPERATING LICENCE CONDITIONS

Summarize water quality and water treatment standards, on-line monitoring conditions, and any other Operating Licence term or conditions with implications to infrastructure, process, treatment or equipment requirements.

2.2 PREVIOUS ASSESSMENT AND FOLLOW-UP ACTIONS

Summarize the major findings and recommendations of the last assessment with consideration to any feedback received from the ODW.

Summarize the status of the Compliance Plan, if applicable, with consideration to any feedback received from the ODW.

Summarize the Action Plan items from the previous assessment and the status of actions taken to address any major deficiencies and recommendations.

2.3 ANNUAL AUDITS AND INSPECTIONS

Summarize comments from the Annual Audits and Inspection letters issued by the ODW where an outstanding deficiency or compliance concern was identified.

2.4 OTHER STUDIES OR REPORTS

Summarize relevant findings and recommendations from any other major studies or reports completed since the last assessment such as feasibility studies, pre-design studies, pilot projects, GUDI assessments or network analysis studies.

2.5 WATER QUALITY DATA

Provide tables summarizing laboratory water quality analysis results for the raw water and the treated water including sampling date for each analysis. Note any exceedances of provincial standards applicable to the System, exceedances of any other Maximum Acceptable Concentration (MAC) from the GCDWQ, and exceedances of any aesthetic objective (AO) from the GCDWQ. A separate table may be required for trihalomethanes (THMs) or other disinfection by-products, if applicable, due to the sampling frequency. (Note: water systems may be monitored at different frequencies for different parameters including general chemical analysis.)

Additional water quality sampling and analysis should not be required.

*For **surface water or GUDI sources**, summarize raw water and filtered water turbidity ranges and seasonal trends.*

Note any significant changes or trends in water quality since the last assessment that are affecting, or could affect, treatment processes, process control or compliance (ex: increasing seasonal turbidity spikes, increasing organic content, bacterial positives).

Identify any other water quality parameters that may affect treatment processes or compliance where a standard or guideline has not been established (ex: ammonia and its impacts on chlorination, water corrosivity and its impacts on lead levels).

Evaluate the apparent ability of the treatment system to address water quality issues and the ability of the system to be operated to meet design objectives/goals.

3.0 OWNER AND DWO CONCERNS

Summarize any concerns identified during the interviews with the Owner and the DWO.

Describe any major changes, upgrades or expansions completed or started since the last assessment, and planned for the system over the next five (5) years.

Describe any major incidents or emergencies since the last assessment including boil water advisories.

4.0 SITE INSPECTION FINDINGS (if performed, indicate reasons if not performed)

List all water system buildings, provide a rating of their general condition, and comment on any significant building environment concerns (ex: major cracking, inadequate ventilation, corrosion, poor surface drainage). Summarize visual observations of the general condition of equipment. Identify deficiencies which could compromise water safety or quality. (Note: a structural condition survey and detailed mechanical/electrical system surveys are not required.)

Note any piping cross connections in the water supply, treatment and distribution systems where backflow could occur and lead to contamination.

5.0 ABILITY TO MEET REGULATORY REQUIREMENTS

5.1 DISINFECTION REQUIREMENTS

*Provide **updated contact time (CT) calculations** where a chemical disinfectant is used for primary disinfection to confirm compliance with contact time requirements for the System. Use CT calculation procedures and tables from the ODW Filtration and Disinfection Log Reduction Credits Guideline and the Chlorine and Alternative Disinfectants Manual. Provide justification for peak hourly flow, effective volume and baffling factor assumptions. Consider the location of inlets and outlets including distribution pump intakes in selecting a baffling factor. If a baffling factor not in conformance with ODW guidelines is proposed, justification such as tracer study results or a written decision from another jurisdiction must be provided.*

Identify any deficiencies in process design or operation that compromise the ability to provide this contact time (ex: raw water bypass present, reservoir cell by-passed during cleaning, daily monitoring not being conducted).

Clearly identify and explain any changes since the last assessment including distribution system expansion leading to a contact time concern.

5.2 LOG REDUCTION CREDITS

*For **all water sources**, complete CT calculations to determine log inactivation for viruses.*

*For **surface water and GUDI sources**, determine filtration credits and/or complete CT calculations or UV dosage comparisons to determine log removal and log inactivation credits for *Cryptosporidium* and *Giardia*.*

Use CT calculation procedures and tables from the ODW Filtration and Disinfection Log Reduction Credits Guideline and the Chlorine and Alternative Disinfectants Manual. Note any deficiencies in process design or operation that compromise the ability to claim full credits (ex: regular unresolved UV alarms, no filter-to-waste, not consistently meeting turbidity standards, not reporting as per continuous monitoring requirements, not conducting daily direct integrity testing of MF/UF membranes).

5.3 TURBIDITY STANDARDS (if applicable)

Discuss any compliance issues related to meeting turbidity standards identified in the Operating Licence including whether an appropriate filtration system is in place. Identify any deficiencies in filtration design or operation that compromise the ability to meet these standards on a continuous basis (ex: turbidimeters not calibrated, lack of continuous monitoring or alarm provisions, inadequate control limits for backwashing or filter-to-waste).

5.4 CHEMICAL STANDARDS (if applicable)

Discuss any compliance issues related to meeting chemical water quality standards identified in the Operating Licence or through the water quality data review, and identify whether an adequate treatment barrier is in place. If a treatment barrier is in place, identify any deficiencies in design or operation that compromise the ability to meet these standards (ex: arsenic not oxidized ahead of membrane). Where a THM or HAA issue is identified, discuss water quality or system characteristics that make it challenging to control THMs or HAAs (ex: high levels of organic matter, lengthy residence times). Evaluate compliance with any other applicable disinfection by-product standards (ex: chlorite, chlorate, bromate, NDMA). If algal blooms are an issue for the source water, discuss any available microcystin (i.e., cyanobacterial toxin) monitoring results and assess the general capabilities of the treatment process to remove algae and their toxins. Evaluate the effectiveness of any corrosion control measures.

6.0 ABILITY TO MEET INDUSTRY BEST PRACTICES

6.1 TEN STATE STANDARDS

For key design and operational parameters discussed in Section 1.0, identify significant deviations from Ten State Standards. For example: no back-up well or raw water pump; inadequate hydrants/flush-outs; critical treatment process not sized to meet MDD with one unit out of service; inadequate water-sewer main separation; reservoir overflow not screened; reservoir hatch not watertight; untreated fire flow bypass; filtration rate higher than recommended; direct connection to sewer. Focus on major deviations which may lead to detrimental effects on the treatment process or treated water quality.

6.2 CROSS CONNECTION CONTROL

Discuss the adequacy of backflow prevention within the water supply, treatment and distribution systems focusing on any back-up water supplies, treatment system bypass, bulk fill stations, heat exchange systems (interconnected with the water supply), chemical feed systems and backwashing connections at the treatment plant, and the potential for unprotected connections at high risk facilities in the distribution system.

6.3 AESTHETIC OBJECTIVES

Discuss the ability of the treatment system to meet aesthetic water quality guidelines. Note if treatment via point-of-use or point-of-entry devices is common (ex: most have a softener).

6.4 OTHER INDUSTRY BEST PRACTICES

Identify water system design provisions or operational procedures that vary from industry best practice such as lack of 24/7 alarm system, no UVT meter, filter-to-waste timed as opposed to automatic based on turbidity, GAC media not regularly replaced, lack of standard operating procedures, no instrument calibration schedule, backflow prevention assemblies not regularly tested, or no leak detection program.

7.0 ABILITY TO MEET DEMANDS

7.1 CAPACITY

Evaluate the ability of the water supply, treatment, storage, pumping and distribution components to meet existing demands. Identify any major physical or capacity limitations that affect anticipated growth or expansion of the system over the next five years. Provide an opinion of the amount of system growth or expansion that can be safely accommodated given the available capacities to supply, treat and distribute the water.

7.2 RELIABILITY

Evaluate the ability of the water supply, treatment, storage, pumping and distribution components to reliably produce safe drinking water through a discussion of physical condition as well as system redundancy, back-up equipment, control and alarm limitations.

8.0 RECOMMENDED UPGRADES AND ACTIONS

Provide a prioritized list/table of infrastructure, process, treatment or equipment related deficiencies and specific recommendations or options for addressing each deficiency. Where a pumping, treatment or storage unit is recommended, provide advice on sizing and selecting a unit (ex: recommended volume, capacity and/or dosage).

Provide a prioritized list/table of other deficiencies and recommended actions to address these deficiencies, for example, lack of system drawings, no reserve fund for watermain replacement/rehabilitation or inadequate sampling.

Where process optimization is recommended, provide advice on optimization strategies (ex: increasing coagulant dosages, lowering pH, adjusting backwashing rates).

Note: depending on their extent and complexity, the lists may be separated into sections addressing water supply, treatment, storage and distribution components, and prioritized.

9.0 OPINION OF PROBABLE COST (not required)

If major capital upgrades are recommended, the Owner may ask the Engineer to prepare a preliminary, broad-scope (order-of-magnitude) opinion of the probable cost of the upgrades.

APPENDICES

- APPENDIX A - PROCESS SCHEMATIC**
- APPENDIX B - INSPECTION PHOTOS**
- APPENDIX C - COPY OF OPERATING LICENCE**
- APPENDIX D - COPY OF ACTION PLAN**
- APPENDIX E - COPY OF COMPLIANCE PLAN**

NOTICE OF COMPLETION OF A RE-ASSESSMENT OF A PUBLIC WATER SYSTEM

TO BE COMPLETED BY THE OWNER:		Date of Report: <i>(yyyy/mm/dd)</i>
Name of Water System:		PWS Code:
Water System Owner:	Water Source: (Surface/Groundwater/GUDI/Combined)	
Number of Service Connections:	Population Served:	
Water System Contact, if different from Water System Owner:	Telephone:	Email:
Water System Owner Address:		
OPERATING LICENCE NUMBER AND DATE OF ISSUE (Where available) :		
As issued under the Drinking Water Safety Act		
<u>Operating Licence Number:</u>	<u>Date of Issue:</u> <i>(yyyy/mm/dd)</i>	
<p>I certify that:</p> <ol style="list-style-type: none"> 1. The attached Report was prepared by a Professional Engineer who met the qualification requirements as stipulated in the "Terms of Reference for Re-Assessment of a Public Water System", and who is not an employee of the Water System Owner. 2. I have read the Report, and it is consistent with my understanding of the Water System. 3. I understand the Report to the best of my ability. 4. The information provided to the engineer, for the basis of this report, was accurate and complete to the best of my ability and knowledge. <p>The undersigned is the person, or the person designated by the Owner as being, responsible for the Water System:</p> <p>Signature of Owner: _____</p> <p>Name of Owner: _____</p> <p>Title: _____</p> <p>Date Signed: _____</p>		

TO BE COMPLETED BY THE ENGINEER:	Date of Report: (yyyy/mm/dd)
Name of Water System:	PWS Code:
Name of Company:	Telephone number of Engineer:
Address:	Email address of Engineer:

I certify that:

1. I prepared this Re-Assessment Report for this Public Water System.
2. I am a Professional Engineer registered in the Province of Manitoba with good standing.
3. I have relevant experience in environmental engineering relating to drinking water supplies.
4. This Report was prepared in accordance with the "Terms of Reference for Re-Assessment of a Public Water System".

DECLARATION OF ENGINEER SIGNING AND SEALING REPORT

"I, the undersigned, hereby declare that to the best of my knowledge, the information contained herein and the information in support of this submission is complete and accurate in accordance with my obligations under *The Engineering and Geoscientific Professions Act* and its regulations.

I further declare that this submission has been prepared in reasonable accordance with the published Terms of Reference for this submission, despite any qualifications in the agreement contracting me, and I acknowledge that the Office of Drinking Water and the Owner will be

Name of Engineer: _____

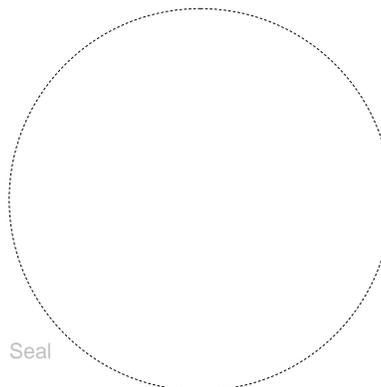
Signature of Engineer: _____

Date Signed: _____

Professional Engineer's seal and Certificate of Authorization to be affixed in the space below and signed by the Professional Engineer who prepared this Report.



Certificate of Authorization



Seal