Indian and Northern Affairs Canada
Affaires indiennes et du Nord Canada

Protocol for Centralised Wastewater Systems in First Nations Communities

Standards for Design, Construction, Operation, Maintenance, and Monitoring of Centralised Wastewater Systems

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This document will evolve based on feedback from users and other stakeholders. Comments on the document and questions on departmental policy on which this document is based may be forwarded to normes-standards@ainc-inac.gc.ca.

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Canada

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Acknowledgements

This protocol was developed with advice provided by First Nations technical representatives, regional and headquarters staff of Indian and Northern Affairs Canada, regional and headquarters staff of Health Canada, and regional and headquarters staff of Environment Canada.

1.0 Introduction

The *Protocol for Centralised Wastewater Systems in First Nations Communities* (Protocol) contains standards for the design, construction, operation, maintenance, and monitoring of centralised wastewater systems in First Nations communities. A centralised wastewater system is a communal system in which wastewater is collected by a piped collector system that transports the wastewater to a central treatment facility.

This document is intended for use by First Nations staff responsible for centralized wastewater systems. It is also intended for use by Indian and Northern Affairs Canada (INAC) staff and all others involved in providing advice or assistance to First Nations in the design, construction, operation, maintenance, and monitoring of wastewater systems in their communities.

As outlined in this Protocol, First Nations responsibilities as they relate to operating centralized wastewater systems are divided between two main groups on reserve: a) band councils, and b) wastewater system operators:

a. Band Councils (chiefs, councillors, utility directors, infrastructure managers, and public works supervisors) are responsible for ensuring that wastewater systems are designed, constructed, and upgraded in accordance with this Protocol. They are also responsible for organising training to ensure that their system's primary and backup operators are trained and certified to the classification level that is appropriate for the system they are managing.

b. Wastewater system operators are responsible for operating and maintaining wastewater systems as well as for implementing effective sampling and testing to monitor effluent quality. They must also keep complete records to fully document maintenance activities, monitoring, and corrective action.

More information on stakeholders' responsibilities as they relate to the operation of wastewater systems on reserve is outlined in Appendix A.

This Protocol was developed with advice provided by First Nations representatives, regional and headquarters staff of Indian and Northern Affairs Canada, Environment Canada, and Health Canada. This document reflects feedback from stakeholders including First Nations technical experts. In the future, this Protocol will evolve and be amended as appropriate to reflect feedback provided from users of the document and changes in policy or

applicable regulations. The latest version of this document will be available on INAC's website (http://www.ainc-inac.gc.ca).

2.0 Application

Any centralized wastewater system that collects, stores, treats, or discharges wastewater, that is funded in whole or in part by INAC, and that serves five or more households or a public facility shall comply with the requirements of this Protocol. Specifically, this Protocol and its requirements apply to the following types of wastewater systems:

- Surface discharge wastewater systems – These are wastewater systems that employ any mechanical, chemical, or biological processes to treat wastewater before the treated effluent is discharged safely to a surface water body.
- Sub-surface discharge wastewater systems – These are wastewater systems that employ any mechanical, chemical, or biological processes to treat wastewater before the treated effluent is discharged safely to a subsurface soil unit.

First Nations are responsible for the design, construction, operation, maintenance, and monitoring of their drinking water systems in accordance with industry best practices and INAC policies and Protocols. INAC staff will provide advice to First Nations regarding complying with INAC requirements.

Operators of First Nations wastewater systems that are covered by this Protocol shall comply with the more stringent of either:

- This Protocol's requirements;
- Federal Requirements under the *Canadian Environmental Protection Act*, 1999;
- Federal requirements under the *Fisheries Act*; or
- Provincial requirements (standards, regulations, codes, or guidelines).

In the case where a particular element in any federal or provincial standard, regulation, code, or guideline is more stringent than a similar element in this Protocol, then the higher objective shall be adhered to for that element; the rest of this Protocol still applies. It is not possible for a First Nation to opt out of this Protocol.

This Protocol does not apply to wastewater systems that serve four or fewer service connections. Wastewater systems with four or fewer household service connections and communally operated on-site wastewater systems are covered in the *Protocol for Decentralized Water and Wastewater Systems in First Nations Communities*. The latest version of the Decentralized Systems Protocol will be available at the INAC web site (http://www.ainc-inac.gc.ca).

This Protocol does not apply to wastewater collected from a reserve via a municipal type agreement (MTA) unless otherwise stipulated in contracts or the terms and conditions of funding agreements between a First Nation and INAC.

This Protocol does not apply to any facilities that are funded, owned, or operated by other government departments.

3.0 Effluent Quality Requirements

All effluents from wastewater systems in Canada must comply with all applicable federal legislation including the *Canadian Environmental Protection Act, 1999* and the *Fisheries Act* as well as any other applicable legislation, including provincial, depending on the geographical location of the system. *The Canadian Environmental Protection Act*, 1999 and the *Fisheries Act* can be found online at:
http://www.ec.gc.ca/CEPARegistry/the_act/
http://www.dfo-mpo.gc.ca/acts-loi-eng.htm

In addition, all discharges from First Nations wastewater systems shall meet the quality requirements found in the *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments* - EPS 1-EC-76-1 (1976 Guidelines). A .pdf file of the Guidelines can be obtained at Environment Canada's web site: (http://www.ec.gc.ca/eu-ww/default.asp?lang=En&n=0FB32EFD-1)

For the purposes of determining effluent quality related to ammonia and chlorine, the *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans for Inorganic Chloramines and Chlorinated Wastewater Effluents* and the *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents* contain additional and/or updated information to the requirements provided in the 1976 Guidelines. The *Notice Requiring the Preparation and Implementation of Pollution Prevention Plans for Inorganic Chloramines and Chlorinated Wastewater Effluents* can be found at Environment Canada's web site:
http://www.ec.gc.ca/planp2-p2plan/default.asp?lang=En&n=022AA832-1

A copy of the *Guideline for the Release of Ammonia Dissolved in Water Found in Wastewater Effluents* can be found at Environment Canada's web site:
http://www.ec.gc.ca/CEPARegistry/documents/glines/mwwe_guide/ammonia_guide.cfm

The Canadian Council of Ministers of the Environment (CCME), including Environment Canada as one member representing the federal government, has endorsed a Canada-wide Strategy for the Management of Municipal Wastewater Effluent. The Strategy will be implemented by each jurisdiction through appropriate modifications to their respective legislative frameworks. Environment Canada intends to implement the Strategy through the new regulations under the *Fisheries Act.* It is anticipated that these regulations will come into force in 2010 or 2011. Once in force, these new regulations will supersede the *1976 Guidelines* in this Protocol. The regulations would apply to all wastewater systems across Canada that discharge 10m³/day or more of effluent to surface water, including those in the Federal departments and agencies and those on federal and

Aboriginal lands. More information can be obtained at Environment Canada's website at: http://www.ec.gc.ca/eu-ww.

3.1 Minimum Wastewater Treatment Requirements

Wastewater treatment systems shall be designed and operated to provide a minimum of secondary-level treatment.

Systems that discharge to sensitive receiving waters shall be designed and operated to provide a minimum of tertiary-level treatment. The sensitivity of receiving waters will depend on several factors such as existing impairments to the quality of the water, presence of important species of flora or fauna, desirable human uses, and will be determined via an environmental risk assessment.

3.2 Waste Stream Protection

Many waste streams from commercial, industrial, and institutional sources cannot be broken down by conventional physical or biological wastewater treatment processes. Thus, directing such pollutants to conventional treatment systems serves only to dilute them before discharging them to receiving waters. First Nations should implement a community education program to make systems users aware of which materials cannot be disposed of in community sewers. Another good step is to implement a community sewer use by-law to regulate what wastes can be disposed of in sewers. First Nation's may wish to consult the following sources for information on model sewer use by-laws:

- CCME's model sewer use by-law: http://www.ccme.ca/assets/pdf/pn1421_model_sewer_use_bylaw_e.pdf
- Nova Scotia's model sewer use by-law is available at this link: http://www.gov.ns.ca/snsmr/muns/infr/sew/default.asp

3.3 Demand Management

Demand on wastewater systems may be moderated by employing a water conservation strategy to reduce water demand and, thus, the amount of wastewater created. Demand Management is a low cost, effective way to extend the service life of wastewater systems in communities with growing populations. Information on demand management can be found at Environment Canada's web site:
http://www.ec.gc.ca/eau-water/default.asp?lang=En&n=F25C70EC-1

3.4 Residuals Management Requirements

All INAC-funded First Nations wastewater treatment plants must develop and use a functional system for the treatment and safe disposal of treatment process residuals (such as sludge and biosolids) and shall comply with the more stringent of applicable federal or provincial regulations, codes of practice, or guidelines for the management and ultimate disposal of sludge, biosolids, and other process residuals.

4.0 Monitoring Requirements

Accurate and timely information is crucial in relation to impacts on receiving waters, treatment process control, collection system integrity, laboratory services, inspection and enforcement, public confidence and emergency responses. Thus, ongoing sampling and testing (monitoring) of effluent quality and treatment system performance is required and shall be conducted by the system operator under the direction of the band council.

Wastewater systems shall be monitored by means of sampling and analytical procedures that are in accordance with the latest edition of *Standard Methods for the Examination of Water and Wastewater*[1] and Environment Canada's reference methods for acute lethality tests. Sampling and analysis of the effluent may indicate whether or not the effluent is deleterious. It is up to the owner/operator to ensure that the parameters they are sampling and analyzing at the discharge point are sufficient for determining the deleteriousness or non-deleteriousness of the effluent. The choice of parameters for testing may depend on facility design criteria, characteristics of the influent, and sensitivity of the receiving environment.

An effective effluent monitoring program should include testing of relevant parameters, effluent quantity monitoring, and a monitoring schedule. At a minimum, an effluent quality monitoring program should include biochemical oxygen demand, chemical oxygen demand, total suspended solids, pH, ammonia, total nitrogen, total phosphorus, metals (including mercury), oil and grease, phenols, total and fecal coliforms, *Escherichia coli* (E.coli) and total residual chlorine (if applicable).

Environment Canada intends to include effluent monitoring of wastewater systems as a requirement in proposed *Fisheries Act* regulation to be published in the *Canada Gazette*, Part I in December 2009. Parameters to be monitored will be the same for all systems, only the frequency of sampling will vary depending on the volume of effluent being discharged.

All samples taken for regulatory purposes must be analyzed at an analytical laboratory accredited through the Canadian Association for Laboratory Accreditation (CALA).

In order to monitor process control, on-site analysis is sufficient. Duplicate samples should be taken for 10% of the process control samples and submitted

[1] Standard Methods for the Examination of Water and Wastewater, 21st Edition, 2005: American Public Health Association, American Water Works Association, Water Environment Federation, ISBN 0-875530478.

to an accredited analytical laboratory for Quality Assurance/Quality Control purposes. Discrepancies greater than 20 percent between on-site analysis and the accredited laboratory should initiate calibration and verification of on-site analytical instrumentation.

4.1 Reporting and Corrective Action for Adverse Results

Adverse wastewater quality results should be reported by the designated individual (i.e. system operator) to INAC, band administration, the Chief and Council, and community administration so that corrective actions and/or follow-up sampling can be performed. Notification to downstream users of water should also be made.

Specific reporting for events such as deposits out of the normal course of events is covered in subsection 38(4) of the *Fisheries Act*. This includes, but is not limited to overflows, spills, leaks, by-passes and regulatory exceedances or other deposits out of compliance. Subsection 38(4)(a) and (4)(b) and subsection 38(5) of the *Fisheries Act* require any person who owns, manages or controls the deleterious substance or causes or contributes to the abnormal deposit to report such occurrence to a fishery inspector. For this reason, it is recommended that environmental emergency response plans to prevent, prepare for, respond to, and correct environmental damage from abnormal deposits be developed by proponents and owners/operators of wastewater systems. Reporting under *Fisheries Act* 38(4) for deposits out of the normal course of events must be to Environment Canada's emergency hotline

As mentioned in Section 3.0 of this Protocol, Environment Canada intends to implement new regulations under the *Fisheries Act*, in 2010 or 2011. When the new regulations come into force, they will supersede the *1976 Guidelines* mentioned in Section 3.0 of this Protocol. Routine reporting will be a mandatory requirement of the new regulations. This reporting will involve the submission of analytical results from specific parameters on a routine basis (e.g. monthly, quarterly, or yearly).

5.0 System Design

Under this protocol, design standards for use in the preparation of plans and specifications for wastewater treatment and collection systems shall be as contained in *Recommended Standards for Wastewater Facilities* (also known as the Ten States Standards for Wastewater Systems), 2004 edition, published by the Great Lakes, Upper Mississippi River, Board of State and Provincial Public Health and Environmental Managers. Information on these standards can be found at:
http://www.hes.org

Designers of First Nations wastewater systems that are covered by this Protocol shall comply with the more stringent of either:

- This Protocol's requirements; or
- Provincial requirements (standards, regulations, codes, or guidelines).

In the case where a particular element in any provincial standard, regulation, code, or guideline is more stringent than a similar element in this Protocol, then the higher objective shall be adhered to for that element; the rest of this Protocol still applies.

Designers of wastewater systems in Atlantic Canada, for instance, should consult the Atlantic Canada Wastewater Guidelines Manual for Collection, Treatment, and Disposal 2006. A copy of this publication is available at:
http://www.gov.ns.ca/nse/water/docs/AtlCanStdGuideSewage.pdf

5.1 Treatment Plants

Wastewater treatment systems must be designed and constructed to provide effluent quality that, at minimum, meets or exceeds that of secondary level treatment. In addition, the design must take into consideration the sensitivity of the receiving environment. The design should be regularly reviewed and the wastewater system upgraded as necessary. Items to consider in designing effective wastewater treatment systems include the treatment processes required, treatment components (including redundancies), equipment design, chemicals used, treatment efficiency, and monitoring procedures. In assessing these components, potential hazards and their causes should be identified along with their associated health risks so priorities for risk management can be established.

Comprehensive, scientifically defensible, and achievable performance standards - based on recognized principles - are essential to ensuring the effectiveness and reliability of wastewater treatment technologies. Decision-makers must balance the need or desire to use the latest technologies against economic realities. Public health and environmental protection goals should be at the forefront of any treatment-related decision. Alternative approaches may be used if these have been demonstrated to the satisfaction of INAC to be equivalent or better ways of achieving the same objectives.

Lagoons must be adequately fenced off to prevent any access by unauthorised personnel.

5.2 Collection Systems

Piped collection systems must be designed, constructed, and upgraded as necessary to ensure that collection system capacity is sufficient to meet domestic demand.

5.3 Trucked Wastewater Collection Systems

Tank trucks used to collect wastewater shall be considered as an extension of the wastewater treatment system.

Under this protocol, the operator of a wastewater collection truck must be trained and certified. Managers of trucked water systems shall ensure that the operators of a delivery truck possess adequate training (or a provincial operator certificate for distribution systems where applicable).

No tank truck used for collecting wastewater may be used to transport drinking water.

5.4 Code Requirements

Wastewater treatment systems should be contained within a building (lagoons excepted) that, as a minimum, provides security so as to protect the system. Buildings and infrastructure will comply with the more stringent of either provincial or federal regulations or codes:

- Structures – Comply with the more stringent of either the applicable provincial building code or the National Building Code.

- Piping – Comply with the more stringent of either the applicable provincial plumbing code or the National Plumbing Code.
- Electrical components - Comply with the more stringent of either the applicable provincial electrical codes or the Canadian Electrical Code.

5.5 Commissioning Plans

Prior to any new or upgraded wastewater system being placed into service, it must undergo commissioning as set out in a commissioning plan that meets the requirements of INAC commissioning guidelines.

5.6 As-built Documents

The wastewater system operator will be provided with as-built documents (as-built plans, design brief, etc.) to be kept permanently in the wastewater treatment plant's records.

6.0 Quality Assurance

To protect public health and the environment and to prolong the service life of wastewater system assets, the system must be inspected regularly to monitor its physical condition, identify maintenance deficiencies, and monitor ongoing system performance in providing treated effluent that is safe for discharge.

6.1 Asset Condition Reporting System (ACRS) Inspections

For centralised wastewater systems, an ACRS (Asset Condition Reporting System) inspection of the wastewater system is to be performed once every three (3) years by a qualified person (consulting engineer, Tribal Council engineer), who is not from the band involved, to assess the condition of the asset, adequacy of maintenance efforts, and need for additional maintenance work. The ACRS inspection report will be discussed with, and submitted to, the band council and the INAC regional office. Inspections will be conducted in accordance with the ACRS Manual, a copy of which can be obtained from the INAC regional office.

6.2 Annual Performance Inspections

For wastewater systems covered by this Protocol, a performance inspection shall be completed annually to verify the performance of the system and update some of the information provided by ACRS inspections. The purpose of an annual performance inspection is to ensure that:

- The wastewater treatment process performs as designed and as per permits (verified via monitored treated effluent quality parameters);
- Operator level of certification aligns with the complexity level of the treatment plant and collection system; and
- The system is operated in conformity with this Protocol.

The annual inspections include site visits conducted by a qualified person (Circuit Rider, licensed consulting engineer, licensed Tribal Council engineer, provincial wastewater system inspector; or a wastewater system operator; none of whom can be a member of the band involved and must be certified or equivalent to the classification level of the system being inspected).

Effluent testing results from the wastewater system operator (operational results) and third party monitoring results for the previous year along with follow-up action reports will be given to the inspector for review and inclusion in the annual

inspection report. The annual report will be discussed with, and submitted to, the band council and to the INAC regional office.

The list of data required to be collected during an annual inspection can be found in INAC's Integrated Capital Management Systems (ICMS). Inspection forms are generated from ICMS by INAC's regional offices. Data is then collected in the field to complete the inspection forms, which are returned to INAC regional offices for input into ICMS. For a copy of the Annual Inspection form or information on ICMS, contact the ICMS co-ordinator at the INAC office in your region.

6.3 Documents Management and Record Keeping

6.3.1 Documents Management

The band council will keep permanently on file the following documents related to the wastewater system:

- Feasibility studies
- Environmental assessments
- Design drawings
- Contract documents
- As-built drawings

The band council will maintain, revise, and keep up to date the following documents:

- Emergency Response Plan

The wastewater system operator will keep on hand copies of the following documents:

- Standard operating procedures
- Maintenance management plan
- Maintenance manuals for each piece of equipment in the plant and the collection system (including trucks used in a trucked wastewater system)
- Emergency response plan
- Commissioning manual
- As-built drawings
- WHMIS documentation (Material Safety Data Sheets)

6.3.2 Record Keeping

The wastewater system operator must keep up-to-date registers in which the dates and results of all required operational sampling and testing are recorded along with the name of the person who conducted the sampling and testing. The data collected for the registers must be kept for a minimum of five years. In addition, wastewater system managers must keep on file all records related to treated effluent monitoring, operations, and system maintenance (including laboratory analyses, ACRS reports, annual performance reports, and consultant reports) for a period of not less than five years. The wastewater system operator's daily and weekly record keeping will include:

- Log book of daily plant checks
- Log book of effluent quality checks
- Log sheets for calibrating analyzers
- Log sheets for chemical volumes used
- Log sheets for chemicals delivered
- Sign-in sheet for visitors
- Maintenance performance logs for all equipment
- Sample analysis results
- Inspection reports

6.4 Compliance Assurance

The intention of compliance assurance is to ensure that appropriate remedial action and monitoring requirements are implemented to protect receiving waters to which treated effluents are discharged. The local authority (e.g.: Environment Canada inspector) and other stakeholders (e.g.: INAC) may recommend to Chief and Council remedial actions when there is a suspected or known risk to receiving waters.

Compliance with this Protocol is a part of the terms and conditions of ongoing funding agreements between the government of Canada and First Nations. As a condition of funding by INAC, First Nations will agree that where public health or the environment (includes fish and fish habitat) are at risk and the First Nation lacks the ability to address the issue, INAC has the right to intervene and engage third-party service providers to temporarily take over control and operation of a wastewater system that is not in compliance with this protocol. In such a case, for systems under temporary third-party control, funds to operate and maintain the system will come from the First Nation's budget.

7.0 Operator Certification Requirements

Wastewater system operator certification requirements will match the requirements of the applicable provincial system. Thus, operators of wastewater treatment plants and wastewater collection systems must be certified to the level specified by provincial operator certification requirements for the classification of system they operate or their work must be overseen by an operator with the required level of certification.

Managers of trucked water systems shall ensure that the operator of the delivery truck possesses adequate training (or a provincial operator certificate for distribution systems where applicable).

Guidance on provincial requirements for certification of wastewater treatment plant and collector system operators is provided in Appendix B. Information provided in Appendix D is subject to change by the Provincial department/agency responsible. Updates of this Protocol will be posted at the INAC web site (http://www.inac-ainc.gc.ca) but the latest information must be obtained directly from the respective Provincial department/agency.

8.0 Emergency Response Plan Requirements

It is required that the Chief and Council shall have in place an emergency response plan (ERP) in the event of any situation where there is a threat source water quality arising from wastewater system effluent.

Chief and Council shall ensure that the ERP is developed in consultation with an emergency response consultant, if available, as well as the wastewater system operator. In addition, the wastewater system's ERP shall be incorporated into the band's community-wide ERP.

The emergency response plan should be reviewed annually. Reviewing the ERP and ensuring that emergency contact phone numbers are fully updated is the responsibility Chief and Council. Emergency response numbers for notifications to Environment Canada of deposits out of the normal course of action should also be included in the ERP. A sample emergency response plan will be available at INAC's web site.

9.0 Public Reporting

To help community members stay informed as to the quality of effluent discharged by their community's wastewater system, it is strongly encouraged that all First Nations wastewater system operating authorities make available to their customers a copy of the most recent Annual Inspection Report as well as copies of up-to-date annual summaries of effluent monitoring results. These records should be made available in printed format in an accessible on-reserve location such as the Band offices.

Appendix A

Stakeholders Roles and Responsibilities

Provision of wastewater services in First Nations communities is a shared responsibility between the following groups:

First Nations

As outlined in this Protocol, First Nations responsibilities as they relate to ensuring wastewater is treated and disposed of properly are divided between two main groups on reserve: a.) band councils, and b.) wastewater system operators:

a. Band Councils (chiefs, councillors, utility directors, infrastructure managers, and public works supervisors) are responsible for ensuring that wastewater systems are designed, constructed, and upgraded in accordance with this Protocol. They are also responsible for organising training to ensure that their systems primary and secondary operators are trained and certified to the classification level that is appropriate for the wastewater treatment plant and collection system.

b. Wastewater system operators are responsible for operating and maintaining wastewater systems as well as for implementing effective sampling and testing to monitor treated effluent quality. They must also keep complete records to fully document maintenance activities, monitoring, and corrective action.

Circuit Riders

Under the department's Circuit Rider Trainer Program (CRTP) INAC provides funds to engage circuit riders (third party wastewater system experts who provide wastewater system operators with on-site, mentoring, training, and emergency assistance). The third-party service providers that provide circuit rider services also provide operators with a 24/7 emergency hotline. To participate in the Circuit Rider Training Program, bands should contact the CRTP co-ordinator at the INAC office in their region.

Tribal Councils

Tribal Councils are service organisations mandated to provide various services to member bands, including technical services. Bands that lack the required human resource capacity to manage and provide their own public works and technical

services, including wastewater services, should contact their Tribal Council for assistance.

Indian and Northern Affairs Canada

INAC provides First Nations with financial assistance and advice for designing, constructing, upgrading, operating, maintaining, and monitoring wastewater facilities. INAC also provides funding and advice for the provision of training of operators and for the provision of services shared between reserves and municipalities through MTAs (municipal-type agreements). Compliance with this Protocol is monitored by INAC regional offices.

Health Canada

Health Canada works in partnership with First Nations communities to ensure that drinking water quality monitoring programs are in place in communities, South of 60^{o}, as per the *Guidelines for Canadian Drinking Water Quality*. These programs include testing drinking water quality and reviewing, interpreting, and disseminating results. In order to build community capacity in environmental health, Health Canada facilitates community-based drinking water quality sampling and testing through the support and training of community-based drinking water quality monitors. Health Canada, through Environmental Health Officers investigates potential problems, provides advice, and makes recommendations to First Nations communities and federal partners, such as Indian and Northern Affairs Canada. Health Canada is also actively involved in the development of community-based education and awareness programs on drinking water issues. In First Nations communities where Environmental Health Programs are transferred, the First Nations stakeholders are responsible for drinking water quality monitoring.

Environment Canada

Environment Canada's roles and responsibilities include the administration and enforcement of federal Acts and/or regulations related to environmental protection, and the provision of information related to regulatory requirements. The existing federal regulatory requirements applicable to the wastewater sector include compliance with:

- pollution prevention provisions of the *Fisheries Act*;
- a *Canadian Environmental Protection Act, 1999* (CEPA 1999) Notice requiring the preparation and implementation of pollution prevention plans for inorganic chloramines and chlorinated wastewater effluents (2004);
- a CEPA 1999 *Guideline for the release of ammonia dissolved in water found in wastewater effluents* (2004); and

- *Guidelines for Effluent Quality and Wastewater Treatment at Federal Establishments* (1976).

From fall 2007 to winter 2008, Environment Canada consulted with First Nations and other interested parties to obtain their input on proposed wastewater effluent regulations under the existing authority of the federal *Fisheries Act*.

These proposed federal effluent quality regulations would apply to all wastewater facilities in Canada, including those in Aboriginal communities. Environment Canada is considering all the input received from First Nations and other interested parties to prepare draft regulations for publication in *Canada Gazette*, Part I in 2009 (specific date to be confirmed).

In addition, Environment Canada participates in the environmental assessment process, as required under the *Canadian Environmental Assessment Act* (CEAA).

Appendix B

Guidance on Provincial Operator Certification Requirements

Operator of water treatment plants and distribution systems must be certified to the level required for their respective drinking water system as specified by the appropriate provincial operator certification program.

British Columbia

Pre-requisites: Grade 12 or combination of experience and training (see tables below)
Length of program: Varies by level
Method of delivery: In-class or self-directed
Certifications provided: Small System, OIT, and Levels 1, 2, 3, and 4

For the most current information, please go to:
http://www.eocp.org/docs/guide.pdf

Pre-requisites: Operator-in-training and Small Systems

Category	Education	Experience
Operator-in-training	12 years of education	3 months experience or completion of an approved course
Small water system	10 years of education + 1.2 CEUs	6 month of experience/50 hours(min) hands-on
Small wastewater system	10 years of education + 1.2 CEUs	6 month of experience/50 hours(min) hands-on

Pre-requisites: Levels 1, 2, 3, and 4

Category	Level 1		Level 2		Level 3			Level 4		
	Educ.	Exp.	Educ.	Exp.	Educ.	Exp.	DRC	Educ.	Exp.	DRC
Water treatment	12	1	12	3	14	4	2	16	4	2
Water distribution	12	1	12	3	14	4		16	4	
Municipal wastewater treatment	12	1	12	3	14	4	2	16	4	2
Wastewater collection	12	1	12	3	14	4		16	4	
Industrial wastewater treatment	12	1	12	3	14	4	2	16	4	2

British Columbia notes:

- Education of 14 years means Grade 12 (or GED) plus 2 additional years of education.
- DRC = Direct responsible charge

Alberta

Pre-requisites: Grade 12 or combination of experience and training (see tables)
Length of program: SSO starts at 6 h
Method of delivery: In-class from AWWOA or other applicable approved training
Certifications provided: Small Systems Operations, Operator Levels 1, 2, 3, and 4

For the most current information, please go to:
http://environment.alberta.ca/1698.html

Pre-requisites

Category	Education	Experience
Small water systems (SWS)	0.6 CEUs small water system course	Minimum 6 months experience in municipal facility
Small wastewater systems (SWWS)	0.6 CEUs small wastewater system course	Minimum 6 months operating experience in municipal facility
Level 1	High school diploma, GED Transcript, or high school equivalency diploma plus: -1.2 CEUs	1 year operating experience in a municipal facility
Level 2	High school diploma, GED Transcript, or high school equivalency diploma	3 years operating experience in a Class 1 or higher
Level 3	High school diploma, GED Transcript, or high school equivalency diploma plus: - Two years **or** 90 CEUs of approved post secondary education	4 years of acceptable operating experience, at least two of which must be in a Class II or higher facility including at least 2 years of DRC
Level 4	High school diploma, GED Transcript, or high school equivalency diploma plus: -Four years or 180 CEUs	4 years of acceptable operating experience, at least two of which must be in a Class III or IV facility including at least 2 years of DRC in Class III or IV

Alberta notes:

- Each level has four categories: water treatment, wastewater treatment, water distribution, and wastewater collection.
- It is possible to work in more than one category in the same year.

Saskatchewan

Pre-requisites: Grade 10 (or GED 10), or Grade 12 (or GED 12), or combination of experience and training (see tables below).
Length of program: Varies by level
Method of delivery: Accredited college
Certifications provided: Small Systems, Classes 1, 2, 3, and 4

For the most current information, go to:
http://www.environment.gov.sk.ca/Default.aspx?DN=6c1f5725-6a82-42d8-a06d-5e227612c4f5

Pre-requisites: Operator-in-training and Small Systems

Category	Education	Experience
Small water system (SWS)	Grade 10 or GED 10	6 month of experience
Small wastewater system (SWWS)	Grade 10 or GED 10	6 month of experience

Pre-requisites: Classes 1, 2, 3, and 4

Category	Class 1		Class 2		Class 3			Class 4		
	Educ.	Exp.	Educ.	Exp.	Educ.	Exp.	DRC	Educ.	Exp.	DRC
Water treatment (WT)	12	1	12	3	14	4	2	16	4	2
Water distribution (WD)	12	1	12	3	14	4	2	16	4	2
Wastewater treatment (WWT)	12	1	12	3	14	4	2	16	4	2
Wastewater collection (WWC)	12	1	12	3	14	4	2	16	4	2

Saskatchewan notes:

- Education of 14 years means Grade 12 or GED 12 plus 2 additional years of education.
- In cases where an operator is required to have four years of operational experience, two of those years must be in a direct responsible charge (DRC) position.

Manitoba

Pre-requisites: Grade 10 (or GED 10) or Grade 12 (or GED 12) (see tables)
Length of program: Varies by level
Method of delivery: Accredited provincial college
Certifications provided: Small Systems, Classes 1, 2, 3, and 4

For the most current information, please go to:
http://web2.gov.mb.ca/laws/regs/pdf/e125-077.03.pdf

Pre-requisites: Small Systems

Category	Education	Experience
Small water system (SWS)	Grade 10 or GED 10	6 month of experience
Small wastewater system (SWWS)	Grade 10 or GED 10	6 month of experience

Pre-requisites: Classes 1, 2, 3, and 4

Category	Class 1		Class 2		Class 3			Class 4		
	Educ.	Exp.	Educ.	Exp.	Educ.	Exp.	DRC	Educ.	Exp.	DRC
Water treatment (WT)	12	1	12	3	14	4	2	16	4	2
Water distribution (WD)	12	1	12	3	14	4	2	16	4	2
Wastewater treatment (WWT)	12	1	12	3	14	4	2	16	4	2
Wastewater collection (WWC)	12	1	12	3	14	4	2	16	4	2

Manitoba notes:

- Education of 14 years means Grade 12 or GED 12 plus 2 additional years of education.

Ontario

Pre-requisites: Grade 12, GED 12, or combination of experience and training (see table)
Length of program: Varies by level
Method of delivery: Private training companies and community colleges
Certifications provided: Operator Classes 1, 2, 3, and 4

Pre-requisites for Classes 1, 2, 3, and 4

Category	Education	Experience
Operator-in-Training	Grade 12 or GED 12	N/A
Class 1	Grade 12 or GED 12	1 year operating experience at Class 1
Class 2	Grade 12 or GED 12	Three years operating experience at Class 1 or higher
Class 3	Grade 12 or GED 12 plus 2 years of relevant education or training	Four years of experience as an operator including at least 2 years as operator-in-charge at a Class 2, 3, or 4 facility.
Class 4	Grade 12 or GED 12 plus 4 years of relevant education or training	Four years of experience as an operator including at least 2 years as operator-in-charge at a Class 3 or 4 facility.

Ontario notes:

- Each level has four categories: water treatment, wastewater treatment, water distribution, and wastewater collection.

Quebec

Pre-requisites: High school graduation or combination of experience and training.
Length of program: Varies from 3 days to 8 days based on complexity of facility for which the training is designed.
Method of delivery: Centre de formation professionnel Paul-Gérin Lajoie (UQAM)
Certifications provided: Training is for existing operators. Certification is not by standardised level (OIT, 1, 2, 3, 4) but instead is tailored to operator's particular facility.

For more information:
http://www.mddep.gouv.qc.ca/eau/potable/brochure/operateur.htm

Atlantic Canada

(Comprised of Nova Scotia, New Brunswick, Prince Edward Island, and Newfoundland and Labrador)

Pre-requisites: Grade 12, GED 12, or combination of experience and training (see table)
Length of program: Varies by level
Certifications provided: Operator Classes 1, 2, 3, and 4

Pre-requisites for Classes 1, 2, 3, and 4

Category	Education	Experience
Class 1	Grade 12 or GED 12	Minimum1 year operating experience at Class 1
Class 2	Grade 12 or GED 12	Three years operating experience at Class 1 or higher
Class 3	Grade 12 or GED 12 plus 2 years or 90 CEUs of post-secondary education	Four years operating experience of which 2 years must be in Class 2 or higher. Half of the experience must be in DRC
Class 4	Grade 12 or GED 12 plus 4 years or 180 CEUs of post-secondary education	Four years operating experience of which 2 years must be in Class 3 or higher. Half of the experience must be in

		DRC

Atlantic notes:

- Each level has four categories: water treatment, wastewater treatment, water distribution, and wastewater collection.
- DRC = direct responsible charge

Appendix C

Wastewater Definitions

Aesthetic objective (AO): Aesthetic objectives are set for drinking water quality parameters such as colour or odour, where an exceedance may make the water less pleasant, but not unsafe.

Bacteria (plural) bacterium (singular): bacteria are microscopic living organisms usually consisting of a single cell. Bacteria can aid in pollution control by consuming or breaking down organic matter in sewage and or other water pollutants. Some bacteria may also cause human, animal and plant health problems. Bacteria are predominantly found in the intestines and feces of humans and animals. The presence of *coliform* bacteria in water indicates the contamination of water by raw or partially treated sewage.

Band-Managed System: A band-managed system is one that is managed and operated by a band, a band-owned utility, or a qualified third party operating under contract to the band.

Centralised Water System: A centralized water system is a communal water system with a centralized treatment facility from which drinking water destined for human consumption is delivered to users by a piped distribution system.

Centralized Wastewater System: A centralised wastewater system is a communal system in which wastewater is delivered to users by a piped collector system to a centralised treatment facility.

Coliform: A group of related bacteria whose presence in drinking water may indicate contamination by disease-causing microorganisms.

Contaminant: A contaminant is anything found in water (including microorganisms, minerals, chemicals, radionuclides, etc.) that may be harmful to human health.
Cryptosporidium: *Cryptosporidium* are protozoic microorganisms commonly found in lakes and rivers. It is highly resistant to disinfection processes and can cause diarrhoea, nausea, and/or stomach cramps.

Decentralized System: The term decentralized system refers to a group or groups of communal (as opposed to private) on-site water or wastewater systems.

Disinfectant: A disinfectant is a chemical (commonly chlorine, chloramines, or ozone) or physical process (e.g., ultraviolet light) that inactivates or kills microorganisms such as bacteria, viruses, and protozoa.

Distribution System: A distribution system is a network of pipes leading from a drinking water treatment plant that delivers finished potable water to customers' plumbing systems.

Effluent: The term effluent refers to wastewater that has been treated.

Escherichia coli: *Escherichia coli* (E. coli) are commonly found in the lower intestine of warm-blooded animals. E. coli are not always confined to the intestine, and their ability to survive for brief periods outside the body makes them an ideal indicator organism to test environmental samples for fecal contamination
Fecal coliforms: Fecal coliforms include the genera that originate in feces; Escherichia as well as genera that are not of fecal origin; *Enterobacter*, *Klebsiella*, and *Citrobacter*. In general, increased levels of fecal coliforms (fecal bacteria) provide a warning of failure in water treatment, a break in the integrity of the distribution system, or possible contamination with pathogens. When levels are high there may be an elevated risk of waterborne gastroenteritis.

Giardia lamblia: *Giardia lamblia* are protozoic microorganisms frequently found in rivers and lakes, which, if not treated properly, may cause diarrhoea, fatigue, and cramps after ingestion.

Microorganisms: Microorganisms, also known as microbes, are tiny living organisms that can be seen only with the aid of a microscope. Some microbes can cause acute health problems when consumed in drinking water.

Pathogen: Pathogen is a term applied to any disease-causing organism.

Potable water: Potable water is water that is safe to drink and destined for human consumption. For the purposes of this Protocol, water destined for human consumption is water that is consumed directly as drinking water, water that is used in cooking, water that is used to wash food, and water that is used for bathing infants (individuals under 1 year of age).

pH: pH is a measure of water’s acidity or alkalinity. Water with a pH of 0 to less than 7 is acidic. A pH of 7 is neutral, neither acidic nor alkaline. Water with a pH greater than 7 to 14 is termed alkaline. In Canada, recommended pH for drinking water is between 6.5 and 8.5.

Public Facility: A public facility is an INAC-funded non-commercial facility (such as a school, band office, or community centre) that is owned or operated by Chief and Council and serves a public function. Facilities funded by other government departments are not covered by this Protocol.

Qualified Band Employee: A qualified band employee is a band employee (a person on the band's pay roll), or a third party operating under contract to the band, who is fully licensed to perform the work in the province in which the work will be performed.

Raw Water: The term raw water refers to water that is in its natural state, prior to any treatment for drinking.

Septic tank: A septic tank is a tank used to detain domestic wastes to allow the settling of solids prior to distribution to a leach field for soil absorption. Septic tanks are used when a sewer line is not available to carry them to a treatment plant. A settling tank in which settled sludge is in immediate contact with sewage flowing through the tank, and wherein solids are decomposed by anaerobic bacterial action.

Source Water: Water in its natural state, prior to any treatment for drinking.

Surface Water: Surface water is any water that is obtained from sources, such as lakes, rivers, and reservoirs that are open to the atmosphere.

System Operator: A system operator is a band employee or a third party under contract to a band who is tasked with the operation and maintenance of a water or wastewater system.

System Manager: A system manager is a band employee or a third party under contract to a band who is tasked with managing a water or wastewater system.

Trihalomethanes: Trihalomethanes (THMs) are formed when chlorine (and or chlorine-based disinfectants) used to control microbial contaminants in drinking water react with naturally occurring organic and inorganic matter in water. They have been shown to cause negative effects in lab animals but their effect on human health is unknown.

Turbidity: Turbidity is the cloudy appearance of water caused by the presence of suspended matter or particles in the water. High levels of turbidity may interfere with proper water treatment and monitoring. In Canada, the maximum acceptable concentration (MAC) for turbidity in drinking water entering a distribution system is 1 NTU (Nephelometric Turbidity Unit). An aesthetic objective of 5 NTU has

been set for samples taken in the distribution system. Turbidity levels higher than 5 NTU in samples collected in the distribution system can indicate severe local corrosion of the water pipes.

Water destined for human consumption: Water destined for human consumption is water that is consumed directly as drinking water, water that is used in cooking, water that is used to wash food, and water that is used for bathing infants (individuals under 1 year in age).

Watershed: The land area from which water drains into a stream, river, or reservoir.

Water quality: The term used to describe the chemical, physical, and biological characteristics of water, usually in respect to its suitability for a particular purpose.

Water use: The term water use refers to water that is used for a specific purpose, such as for domestic use, irrigation, or industrial processing. Water use pertains to human's interaction with and influence on the hydrologic cycle, and includes elements, such as water withdrawal from surface- and ground-water sources, water delivery to homes and businesses, consumptive use of water, water released from wastewater-treatment plants, water returned to the environment, and in-stream uses, such as using water to produce hydroelectric power.