

PROVINCE OF SASKATCHEWAN



07-08

ANNUAL REPORT

**MINISTRY OF  
ENVIRONMENT**

State of Drinking Water Quality  
in Saskatchewan

and the

Safe Drinking Water  
Strategy

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# Table of Contents

<b>Letters of Transmittal</b> .....	ii
<b>Introduction</b> .....	1
<b>An Overview of Drinking Water Management in Saskatchewan</b> .....	2
<b>Progress in 2007-08</b> .....	4
A New Government Direction – Growth, Security and Promises.....	4
Minister’s Mandate Letter, November 2007 .....	5
December 2007 Speech from the Throne.....	5
Progress by Key Activity and the Status of Drinking Water in Saskatchewan 2007-08 .....	5
Key Area - Waterworks systems and operations provide safe, clean and sustainable drinking water .....	6
Waterworks staff are capable and well-trained.....	6
Infrastructure produces water that meets the National Drinking Water Quality Guidelines.....	10
Waterworks systems and operations are financially sustainable .....	20
Key Area - The drinking water regulatory system is clear and effective .....	21
Regulations are clear and ensure that health and drinking water quality will be protected. ....	21
Professional regulatory staff has access to the tools necessary to ensure compliance.....	29
Key Area - High quality source waters are protected now and into the future.....	31
Risks to source water quality are known. ....	31
Watersheds are protected, natural purification and protection processes are maximized and potential for contamination is minimized. ....	33
Key Area - Citizens and consumers trust and value their drinking water and the operations which produce it. ....	39
Consumers value quality water and are willing to pay for it.....	39
Citizens and consumers trust the quality and reliability of their drinking water systems and are confident in the regulatory system.....	40
Citizens have meaningful access to information about the quality of their water. ....	42
Reduced consumption of water .....	43
<b>2007-08 Financial Overview</b> .....	45
Expenditures .....	46
Revenues .....	47
<b>Where to Obtain Additional Information</b> .....	47
<b>Appendix A: List of Acronyms Contained Within This Document</b> .....	48

Note: An electronic copy of this document is available online a <http://www.saskh20.ca/news.asp>

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# Letters of Transmittal



July 2008

His Honour the Honourable Dr. Gordon L. Barnhart, S.O.M., Ph.D.  
Lieutenant Governor  
Province of Saskatchewan

May It Please Your Honour:

I respectfully submit the combined Annual Report on the State of Drinking Water Quality and the Safe Drinking Water Strategy for the fiscal year ending March 31, 2008.

Since the election in November 2007, this government has been building on its values of growth, security, and promises. During this time, government has been deliberating on how to strategically invest in Saskatchewan to ensure the momentum translates into long-term, sustained economic prosperity, and to make certain that the benefits of the growing economy are felt by everyone who calls Saskatchewan home.

We are committed to accountability and to ensuring that we deliver on our commitments. A significant number of commitments have already been made to Saskatchewan people in 2007-08 in the election platform, the Speech from the Throne and in the Ministers Mandate letters. This report will provide progress on those commitments as they relate to drinking water and source water protection activities of involved Ministries and Agencies as of March 31, 2008. We look forward to furthering our commitment to improved accountability as 2008-09 progresses.

Respectfully submitted,

A handwritten signature in black ink that reads "Nancy Heppner". The signature is fluid and cursive, with a long horizontal stroke extending to the right.

Nancy Heppner  
Minister of Environment



July 2008

The Honourable Nancy Heppner.  
Minister of Environment

Dear Minister Heppner:

I respectfully submit the combined Annual Report on the State of Drinking Water Quality and the Safe Drinking Water Strategy for the fiscal year ending March 31, 2008.

The 2007-08 report describes the drinking water related activities of ministries and agencies involved in drinking water and source water protection activities in Saskatchewan. Key partners in protecting and improving Saskatchewan's drinking water supplies and source waters include the Ministry of Environment, Ministry of Health, Regional Health Authorities, Saskatchewan Watershed Authority, SaskWater, the Ministry of Municipal Affairs and the Ministry of Agriculture.

On behalf of the key partners, the Ministry of Environment provides information on our collective accomplishments in the protection, conservation and sustainable development of drinking water and related source water resources during 2007-08. We use the services water provides for a variety of services including agricultural production, manufacturing, resource development, drought protection, waterpower, aquatic habitat, recreation and biodiversity. We rely on its steady supply for many purposes and we expect that every time we turn the tap, clean, safe water will fill our glass.

Our rural communities and cities will benefit from our efforts to strengthen the health of our province and its citizens by working to improve drinking water. The management of our groundwater and watersheds, and the continued abundant supply of clean water will be important to the future of our economy and ongoing development in the province.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'E. Quarshie'. The signature is stylized and cursive.

Elizabeth Quarshie  
Deputy Minister

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# Introduction

Safe drinking water is a vital component in the protection of public health and disease prevention and therefore essential for the health and well being of Saskatchewan's citizens. High quality water is important in maintaining natural ecosystems and the species that depend upon them, the productivity of industry, sustaining commerce and is vital to ensuring productive farms and ranches. The quality of drinking water, the condition of systems that produce it and protection of source waters remains an important public health and environmental issue in Saskatchewan at the present time and for the future.

This is the sixth annual report on the Status of Drinking Water in Saskatchewan. This report is intended to inform residents of Saskatchewan of the status of drinking water quality, waterworks infrastructure, source water protection and water related items and measures in the province over the April 1, 2007 to March 31, 2008 period. The report is a legislated requirement under *The Environmental Management and Protection Act, 2002* and will be provided on an annual basis in future years.

The report outlines the roles, responsibilities and resources of ministries and agencies involved in water management, the regulatory framework and activities undertaken by the Government of Saskatchewan to manage drinking water. The report also discusses operator certification, drinking water quality monitoring, source protection, information management systems and public education initiatives which are key actions and indicators of performance in improving drinking water quality in Saskatchewan. An update on progress in addressing the recommendations of the Report of the Commission of Inquiry into the City of North Battleford's drinking water is available on the Internet ([http://www.saskh2o.ca/WaterInformationFactSheet\\_annualreport.asp](http://www.saskh2o.ca/WaterInformationFactSheet_annualreport.asp)).

The report was built on contributions from Saskatchewan Ministries of Environment, Health, Municipal Affairs and Agriculture, as well as material provided by the Saskatchewan Watershed Authority and SaskWater. The Saskatchewan Ministry of Environment's Drinking Water Quality Section compiled the report.

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# An Overview of Drinking Water Management in Saskatchewan

Since the waterborne disease outbreaks of May 2000 in Walkerton, Ontario and spring 2001 in North Battleford, Saskatchewan the Government of Saskatchewan has heightened and focused efforts to improve drinking water supplies and protect source waters in the province. The intent of these efforts is also to provide safe drinking water. These actions are also intended to reassure the citizens of the province that government is helping to ensure the water we drink is safe.

Several ministries and agencies are involved in the governance and protection of drinking water supplies and source waters in Saskatchewan including the Saskatchewan Ministry of Environment; Saskatchewan Ministry of Health; Health Regions; Saskatchewan Watershed Authority; SaskWater; Saskatchewan Ministry of Municipal Affairs; and the Saskatchewan Ministry of Agriculture. The following is a summary of the major roles, priorities and actions of each of the government ministries and agencies involved in drinking water management and source water protection.

## **Saskatchewan Ministry of Environment**

- leads ongoing planning, implementation and reporting associated with drinking water governance and management to which all participating ministries and agencies contribute;
- implements, inspects and regulates compliance for 569 licensed municipal waterworks, 51 permitted pipelines, 34 regional or provincial park waterworks, 24 industrial waterworks, 59 other permitted waterworks (such as trailer courts, institutions and Hutterite colonies) and 568 wastewater facilities under *The Water Regulations, 2002*;
- issues permits for construction and operation of water and wastewater works;
- develops policy, protocol, water quality standard and guideline to support protection of drinking water and implementation of *The Water Regulations, 2002*;
- liaises with the Operator Certification Board (OCB);
- manages the Ministry of Environment drinking water information system (Environmental Management System (EMS)) that houses water quality and inspection data for all Ministry of Environment regulated waterworks and wastewater works in the province;
- monitors surface water quality at primary water quality stations across the province; and
- manages the SaskH2O.ca website that supplies a broad range of drinking water related information gathered from water management authorities within the province.

## **Saskatchewan Ministry of Municipal Affairs**

- for 2007-08, provided financial assistance for water infrastructure under the Canada-Saskatchewan Municipal Rural Infrastructure Fund (MRIF), the Canada-Saskatchewan Infrastructure Program (CSIP) and the Northern Water and Sewer Program;
- the CSIP program was transferred to the Ministry of Highways and Infrastructure as per Order in Council on November 21, 2007;
- legislates and regulates pricing policies and capital investment strategies for municipal waterworks; and
- legislates and regulates municipal protection of water sources through planning bylaws.

## **Saskatchewan Watershed Authority**

- monitors source (surface/ground) water;
- leads watershed and aquifer planning;
- owns, operates and maintains water management infrastructure;
- provides waterworks source water approval (except municipal);
- allocates groundwater and surface water for use; and
- develops and provides "State of Watershed Reporting".

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### **Saskatchewan Ministry of Health/Health Regions**

- Inspects for compliance at semi-public waterworks and certain other waterworks as required by *The Health Hazard Regulations*;
- manage data systems for Public Health Inspectors and laboratory information;
- analyses water through the Saskatchewan Disease Control Laboratory; and
- provides advice and addresses waterborne illnesses.

### **Saskatchewan Ministry of Agriculture**

- has responsibility under *The Agricultural Operations Act* for intensive livestock provisions;
- administers *The Irrigation Act, 1996* and provides water related advice;
- provides pesticide (applicator) licenses;
- conducts research, demonstrations and technology transfer;
- provides advice on farm water supplies; and
- coordinates Environmental Farm Planning (Federal/Provincial Agricultural Policy Framework).

### **SaskWater**

- provides potable and non-potable water supply to residents and businesses;
- provides wastewater treatment and management services on a commercial basis;
- designs, builds, owns and operates water supply and wastewater systems;
- provides certified operation and maintenance for customer-owned systems; and
- provides project management services and operator training.

The Saskatchewan Ministry of Environment, Saskatchewan Ministry of Health and the individual Health Regions deliver water and wastewater programming and governance through a system of centralized planning, protocol and standards development and regionalized inspection and compliance services. During 2007-08, the Saskatchewan Ministry of Environment's staff complement totaled 36.7 Full Time Equivalents (FTE) for delivery of all aspects of the ministry's drinking water and wastewater management activities. An additional three FTEs are employed by the Ministry of Environment in the management of the Environmental Management System and the SaskH2O.ca website. Saskatchewan Ministry of Health's Saskatchewan Disease Control Laboratory has 19.5 FTEs that are dedicated to water testing and the accreditation program in support of the Safe Drinking Water Strategy. Health Region Public Health Inspectors, Medical Health Officers and Public Health Nurses also play a role in water related activities (i.e. inspection of semi-public water supplies, issuance of Emergency Boil Water Orders (EBWOs), water borne disease investigations).

The Saskatchewan Ministry of Agriculture has 10 FTEs that deliver intensive livestock inspection and regulatory approval services to ensure protection of water resources from intensive livestock operations. Two full time positions are housed within the Development Division addressing environmental issues related to livestock development with respect to research, development, engineering and technology transfer. Staff of the Saskatchewan Ministry of Agriculture continue to participate in the Aquifer/Watershed planning activities and technical committees. The ministry also develops and distributes management and technology information for conservation and grazing and crop production that reduce and/or minimize impacts to water resources. The ministry has three FTEs delivering pesticide regulatory services.

*The Pest Control Products (Saskatchewan) Act and Regulations* require any individual who uses or applies a pesticide to hold a valid pesticide applicator license. An applicant for a pesticide applicator license must pass a pesticide applicator course, which is valid for five years. The Business and Agriculture Division of the Saskatchewan Institute of Applied Science and Technology offer pesticide applicator courses. There is a high value placed on education of the user of pesticides to mitigate the risks associated with pesticide usage. Training is recognized internationally as a key tool in risk reduction. Training results in more responsible use of pesticides, while keeping the environment safe for the public. There are currently 2,653 licensed applicators in the province.

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The Saskatchewan Ministry of Agriculture administers *The Irrigation Act, 1996*. The legislation ensures soils and water are suitable for sustainable irrigation. Irrigation soils, water quality and water tables are monitored for sustainability.

The Saskatchewan Ministry of Municipal Affairs water related programming is mainly provided through centralized policy development and program delivery services.

Key partners outside the provincial government include the federal government through the Canada-Saskatchewan Municipal Rural Infrastructure Fund, Federal Gas Tax program, participants in the Agricultural Policy Framework, municipalities and other waterworks owners, the Saskatchewan Urban Municipalities Association (SUMA), the Saskatchewan Association of Rural Municipalities (SARM), the Saskatchewan Water and Wastewater Association (SWWA) and the Operator Certification Board (OCB). SWWA and the OCB have been instrumental in advancing waterworks operator certification in the province. The OCB is appointed by Government, but operates at arm's length in considering the qualification and standing of water and wastewater works operators in the province. Key stakeholders are consulted on a periodic basis to aid in the ongoing development and delivery of drinking water and wastewater related programming and activities of the Government of Saskatchewan.

The sections of the report that follow provide information on the status of drinking water in Saskatchewan during 2007-08. Further information on drinking water quality is available on the SaskH2O Website (<http://www.SaskH2O.ca>) and on the Saskatchewan Ministry of Environment's Website (<http://www.environment.gov.sk.ca>). Additional detailed background information regarding drinking water quality in Saskatchewan is available at <http://www.SaskH2O.ca/news.asp> on the internet. The following sections also report on the key actions and the level of performance in achieving key indicators for the improvement in drinking water and related protection and enhancement measures.

Transparency regarding the status of drinking water is intended to improve trust in drinking water supplies and the waterworks systems that produce it. Public reporting is intended to further the accountability of the ministries and agencies that manage and govern drinking water in the province.

## **Progress in 2007-08**

The key actions originally presented in our 2007-08 Plan are provided below, organized by common activities focusing on various components of drinking water and source water protection and followed by a report on actual progress for each. Actual results information is included for all key actions and performance measures that were published in the 2007-08 Performance Plan for the Safe Drinking Water Strategy as well as for all commitments related to the Saskatchewan Ministry of Environment from the Minister's Mandate letter, the December 2007 Throne Speech and other key commitments during 2007-08 where significant progress has been achieved.

## **A New Government Direction – Growth, Security and Promises**

This report provides results since the election of the new government in November of 2007 related to the new government's strategic priorities: growth, security and promises as presented in the Minister's Mandate letter, the December Speech from the Throne and other key government commitments.

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## Minister's Mandate Letter – November 2007

On November 21, 2007, the Honourable Brad Wall, Premier of Saskatchewan delivered mandate letters to Cabinet Ministers including those responsible for ministries which are engaged in water management within the province. Through his mandate letter, the Premier called upon The Honourable Nancy Heppner, Minister of Environment to:

*“Ensure Saskatchewan communities have access to safe and clean water supplies.”*

## December 2007 Speech from the Throne

The Speech from the Throne delivered on Monday December 10, 2007, outlined Government's commitments to protecting and enhancing drinking water and source water as follows:

*“My government is committed to protecting and conserving our natural resources. In addition to clean air, the people of Saskatchewan must have access to clean drinking water, abundant and diverse wildlife and pristine lakes for recreational use. “*

Given the importance of safe and clean supplies of drinking water and source waters to the residents of Saskatchewan, the Government has placed a high priority on ensuring and advancing safe drinking water. Some additional accomplishments since November 2007 include the following:

- Saskatchewan signed with the federal government an Infrastructure Framework Agreement in April 2008 that includes the Building Canada Fund Communities Component, which will provide \$189 million in federal and provincial funds to Saskatchewan communities with less than 100,000 people. The program will be application based and sewer and water projects will be eligible under the program. Communities will decide their priority projects.
- A \$6 million dollar Saskatchewan Farm and Ranch Water Infrastructure Fund announced in March 2008. The new fund will help to address long-standing water supply issues in dry areas of the province, particularly in the southwest. The fund will help lessen the impact of drought and provide a secure water source for Saskatchewan farmers and ranchers.
- Through the Canada-Saskatchewan Municipal Rural Infrastructure Fund (MRIF), the Hamlet of McCord was approved for \$16,870 of federal and provincial funding under the MRIF to connect to a chlorinated water distribution system.
- The Village of Glenavon was approved for \$9,720 of federal and provincial funding under the MRIF for replacement of a pumphouse. These improvements will reduce the chance of contaminants entering the water supply system from the pumphouse site.
- The Town of Wilkie was approved for \$131,074 of federal and provincial funding under the MRIF to install water meters to reduce water use.

## Progress by Key Activity and the Status of Saskatchewan's Drinking Water 2007-08

The following is a summary of information on the status of drinking water in Saskatchewan and progress on commitments, key activities and measurement results published for the Safe Drinking Water Strategy for 2007-08. Further information is available by contacting the Saskatchewan Ministry of Environment or on the Internet (<http://www.SaskH2O.ca>). Planned key activities for 2007-08 are denoted by bold faced text. The Ministry or agency designated as lead for a planned activity is shown in square brackets following the description of the activity.

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Ministries and agencies engaged in drinking water management in Saskatchewan use performance information to assess overall progress towards improving the safety and management of drinking water in the province. In turn, reviews and assessments each year allow and direct the most effective adjustment of future plans and actions to address priority elements. Management affirms that all major external factors that could have an impact on performance results have been identified and explained. Additionally, significant efforts have been made to ensure performance data is valid through ongoing review and validation of data. In general, performance in addressing drinking water quality and source water protection management in Saskatchewan has paralleled or exceeded performance in other Canadian provinces where similar strategic initiatives are in place.

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## **Key Area: Waterworks systems and operations provide safe, clean and sustainable drinking water**

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### **Waterworks staff are capable and well trained**

Provision of safe drinking water is highly reliant on the knowledge and capabilities of waterworks operators and the manner in which they apply their skills to produce and monitor the quality of drinking water. Along with source protection, sound and capable infrastructure and water quality monitoring; knowledgeable operators capable of sound waterworks operations are one of the elements of a “multi-barrier approach” to ensure safe drinking water. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that waterworks staff are capable and well trained.

#### **Commitments, Activities and Achievements**

**Planned Activity: Support and advance ongoing compliance in operator training, certification and continuing education. This commitment is met through inspections, aligned policies, workshops and liaison with the Saskatchewan Water and Wastewater Association (SWWA) and the Operator Certification Board (OCB). Continue co-operative actions with training organizations and the OCB to facilitate training and certification of First Nations operators. [Environment]**

During the 2007-08 reporting period, the Saskatchewan Ministry of Environment worked to facilitate operator certification by encouraging Advanced Technologies Applications (ATAP) Infrastructure Management, the Saskatchewan Institute of Applied Science and Technology (SIAST) and some of the Regional Community Colleges to continue offering Certification Preparation classes. Typically, certification classes last from three to five days, depending on the level, and includes water treatment, distribution, wastewater treatment and collection. These classes included certification examinations. Continuing Education Units (CEU) are assigned to operators attending these classes, where 1.0 CEU represents 10 hours of formal classroom instruction. Successful completion of the certification examinations allows operators to meet one of the certification criteria; the other criteria are formal education and facility work experience.

Operator certification and continuing education requirements are reviewed and discussed during each waterworks and sewage works inspection to help ensure operators remain current with certification requirements.

Since July 15, 2005 operators had to attain on-going training in an area the OCB considered appropriate to certification renewal. *The Water Regulations, 2002* require operators to earn 1.0 CEU during the two-year term of their certificate, leading up to renewal. On-going training was provided by SIAST, ATAP Infrastructure Management, SWWA, Saskatchewan Association of Rural Water Pipelines (SARWP), Regional Community Colleges, New North and a number of other agencies within and outside

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Saskatchewan. Operators could also access appropriate correspondence courses such as those offered by SIAST and the American Water Wastewater Association (AWWA).

During 2007-08 approximately 71 per cent of operators receiving renewal notification from the OCB actually renewed their certification. In contrast during 2006-07, 95 per cent of operators renewed their certification on notification by the OCB. This drop in renewal in comparison with the 2006-07 fiscal year is caused in part by late applications for renewal by operators and a higher rate of retirements by operators.

The Saskatchewan Ministry of Environment has contributed to workshops and conferences offered by SWWA, SARWP, New North and First Nations.

**Planned Activity: Advance implementation of changes arising from consultation with the Certification Advisory Committee (CAC), by evaluating the need for all operators working at Environment regulated waterworks to certify to some level by 2010. [Environment]**

The CAC included recommendations regarding examinations, applicability of examinations, certification of individuals, use of National Occupational Guidelines for Canadian Water and Wastewater Operators, application of “direct responsible charge”, certification upgrading and the use of CEUs for certification renewal.

Recently federal funding for the National Occupational Guidelines for Canadian Water and Wastewater Operators was abolished, leaving the Saskatchewan Ministry of Environment without an integral component of their Operator Certification Renewal Process. The Ministry is presently pursuing options to alleviate this problem.

The CAC also made a number of recommendations to ease certification for smaller communities by encouraging Small Water and Wastewater facilities certification; encouraging “Regional Operator” certification and “Hygienic Use Water System” exemption to certification.

The Saskatchewan Ministry of Environment has studied the recommendations of the CAC and has made amendments to the Operator Certification Standards 2002 and to the Water and Wastewater Operator Certification Program Guide. Before final implementation of these policy amendments, consultation with the CAC will occur.

**Planned Activity: Advance operator continuing education opportunities along with training partners. [Environment]**

During the 2007-08 reporting period, the Saskatchewan Ministry of Environment liaised with SIAST on the content and requirements for operator training in Saskatchewan as a way to ensure educational opportunities meet the needs of waterworks operators in the province. Ministry staff also supported SWWA by providing instruction during training workshops.

In terms of overall progress on operator certification, the OCB continued to certify water and wastewater works operators throughout 2007-08. As of March 31, 2008, there were 638 waterworks licensed by Saskatchewan Ministry of Environment with at least one certified operator, regional operator or contract operator (See Table 1). Certification trends for 2007-08 continued to show an increase in the number of waterworks with at least one certified operator. Some operators continue to take exams and are in the process of obtaining certification or of upgrading their certification levels and categories. Saskatchewan Ministry of Environment continues to work with municipalities, waterworks owners and others to maintain and to advance the implementation of operator certification and continuing education in the province.

Table 1 provides additional trend information on the number of waterworks with certified operators since 2000-01 for all waterworks regulated by Saskatchewan Ministry of Environment.

**Table 1: Summary of Certification Trends for Water and Wastewater Works Since 2000-01**

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
Certified operators*	44	293	403	533	682	1107	1170	1223
All Waterworks with certified operators	24	116	217	219	326	532	614	638
All Waterworks meeting new certification standards	1	35	92	144	202	461	501	521
Per cent meeting new certification standard	0.2%	5.7%	15%	23%	35%	74%***	80%****	82%**** *
Number of licensed works **	609	609	617	630	641	714***	728****	724*****

\* Operators working in Saskatchewan Ministry of Environment regulated waterworks.

\*\*Licensed works includes municipal water treatment works, water distribution systems, wastewater treatment works and wastewater collection systems.

\*\*\* 92 of the licensed waterworks in the province have applied for or been granted hygienic classification as of March 31, 2006. Waterworks classified as hygienic systems do not require a certified operator.

\*\*\*\* 101 of the licensed waterworks in the province have applied for or been granted hygienic classification as of March 31, 2007. Percentage of overall compliance is based on the reduced number of human consumptive systems waterworks requiring certification (628). Additionally, some other waterworks operators were in the process of examination or certification as of the end of the reporting period. Additionally, some works were permitted near the end of the reporting period.

\*\*\*\*\* 86 of the licensed waterworks in the province have been granted hygienic classification as of March 31, 2008. Another 21 are in the process of pursuing hygienic status. Percentage of overall compliance is based on the reduced number of human consumptive systems waterworks requiring certification (638). Additionally, some other waterworks operators were in the process of examination or certification as of the end of the reporting period. Additionally, some works were permitted near the end of the reporting period.

Source: Operator Certification Board database and Saskatchewan Ministry of Environment hygienic waterworks listing.

Table 2 provides information on the number of operators certified at various levels in all categories of the water and wastewater treatment industry in Saskatchewan during 2007-08.

**Table 2: Distribution of Certified Operators at Water and Wastewater Works - Fiscal Year 2007-08**

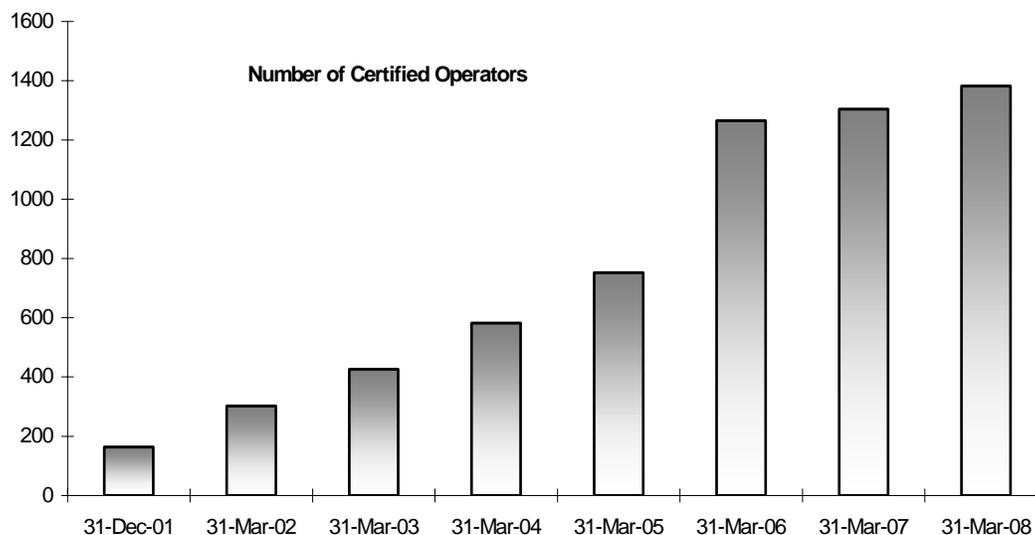
System Classification	Water Treatment	Water Distribution	Wastewater Treatment	Wastewater Collection
Small System <sup>1</sup>	209	209	127	127
Class-1	380	484	416	387
Class-2	286	288	88	150
Class-3	59	15	16	5
Class-4	41	19	27	13
Total	975	1015	674	682

<sup>1</sup> There are several types of Small Systems. A Small Water System is defined as a Class-1 groundwater treatment and/or Class-1 distribution system, serving fewer than 500 people. Small treated drinking water pipelines serving fewer than 500 people can be classified as Small Systems and some of their operators have become certified as Small System operators and are shown only under Water Distribution. A Small Wastewater System is a Class-1 wastewater treatment system (generally a lagoon system) and/or a Class-1 collection system serving fewer than 500 people.

Source: Operator Certification Board Database

Figure 1 provides a historical summary of the number of operators certified to date. During 2007-08, the number of all certified operators reported by the OCB increased to 1,382 as of March 31, 2008. These are all the certified operators, including those who do not operate waterworks regulated by Saskatchewan Ministry of Environment. Indian and Northern Affairs Canada (INAC) required First Nation operators to become certified by the same criteria of education, experience and examination as operators mandated by Saskatchewan Ministry of Environment. Since INAC did not have a certification program of its own, Saskatchewan Ministry of Environment invited the First Nations operators to participate in its certification program and 159 were certified at the end of this fiscal year.

**Figure 1: Summary of Certified Operator Trends**



Source: Saskatchewan Ministry Environment certification records database

The number of certified operators applying for initial certification during this last fiscal year is 138, and there were approximately 115 operators who applied to upgrade their certification by either increasing their level of certification or adding new categories of certification. A summary of communities with Certified Operators and Operator Classification, updated after each Operator Certification Board meeting, is available at [www.SaskH2O.ca/foroperators.aspx](http://www.SaskH2O.ca/foroperators.aspx) on the Internet.

### Measurement Results

*Per cent of communities with human consumptive waterworks whose operators have received some level of certification*

**Table 3: Per cent of communities with human consumptive waterworks whose operators have received some level of certification**

	September 30, 2004	March 31, 2006	March 31, 2007	March 31, 2008	Annual Change
Per cent of communities with human consumptive waterworks whose operators have received some level of certification	54.3	96.8	98.9	99.2	0.3↑

Source: Ministry of Environment – Environmental Management System

As of March 31, 2008, 99.2 per cent of communities with human consumptive waterworks have operators that have achieved some level of certification (Table 3). This is a slight increase since the previous year when 98.9 per cent of community waterworks had an operator certified to some level. Approximately 99.95 per cent of the population served by a community (municipal) human consumptive waterworks have an operator that has received full certification or some level of training. Knowledgeable, certified operators help to ensure safe drinking water.

Compliance with operator certification and therefore achievement of this measure is primarily controlled by the owner of the waterworks, but also requires cooperation from the waterworks operator(s). Acceptance and uptake of operator certification is key to ensuring the delivery of safe drinking water and therefore a reason this measure was selected. As a point of comparison, Alberta's (population 3.2 million) mandatory certification program took effect on January 1, 1983, and its program currently has 1,831 certified operators. Currently their certification examinations, certification applications and certificate renewals are free. Saskatchewan (population approximately 1.0 million) has 1,304 certified operators, examinations cost about \$95.00 and certification and renewal fees (every two years) are \$130.00. All things considered, Saskatchewan's certification program has progressed very well in comparison.

### Infrastructure produces water that meets the National Drinking Water Quality Guidelines

Infrastructure design, capability, condition and maintenance are critical in the production of safe drinking water. Standards, incentives, requirements, compliance measures and implementation plans are also important to ensure that waterworks are operated and monitored to achieve drinking water of a quality that protects human health. The [Guidelines for Canadian Drinking Water Quality](http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index_e.html) (see: [http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum\\_guide-res\\_recom/index\\_e.html](http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index_e.html)) are used in Canada as the definitive measure of science-based safety criteria for drinking water. Saskatchewan has now adopted the guidelines as standards (see: [http://www.saskh2o.ca/DWBinder/EPB207Drinking\\_Water\\_Standards\\_post.pdf](http://www.saskh2o.ca/DWBinder/EPB207Drinking_Water_Standards_post.pdf)). The following is a

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summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that infrastructure produces water that meets national drinking water quality guidelines.

### **Commitments, Activities and Achievements**

**Planned Activity: Implement and track strategies to aid small communities in ensuring the provision of safe water by affordable and publicly acceptable means. [Environment]**

The Saskatchewan Ministry of Environment has commenced implementation of regulatory amendments aimed at reducing the cost of provision of safe drinking water without compromising safety. Changes were made significantly reducing or eliminating the need to perform a repeat waterworks system assessment, particularly in small communities reliant on secure groundwater. Changes were also made which affected operator certification requirements for very small communities with secure groundwater supplies. Information regarding the regulatory changes was developed and delivered to affected waterworks owners. Application of the hygienic waterworks requirements that alleviate many requirements for small waterworks, while ensuring provision of safe water, continued during 2007-08. The ministry also continued to implement the regional/contract operator certification policy to assist in ensuring waterworks operation are under the direction of a certified operator.

**Planned Activity: Participate in the federal/provincial Committee on Drinking Water as a means to support development of the Guidelines for Canadian Drinking Water Quality and thereby support provision of safe drinking water in Saskatchewan. [Environment]**

The Saskatchewan Ministry of Environment participated as a member of the Federal-Provincial Committee on Drinking Water during 2007-08. During that time period, national guidelines on turbidity, protozoa, viruses, bacteria (total coliform and *Escherichia coli*), benzene, carbon tetrachloride, chlorate/chlorite, chlorine, chloral hydrate, corrosion control, haloacetic acids, MCPA (2-methyl-4-chlorophenoxyacetic acid), potassium, radiological parameters and Bromodichloromethane were advanced through development and in some cases to completion. A national guidance document on boil water advisories was also completed. These national guidelines form the basis for drinking water quality standards in Saskatchewan and other jurisdictions across Canada.

**Planned Activity: Implement proactive measures to ensure timely compliance with drinking water quality standards at existing waterworks in the province that it regulates. [Environment]**

The Saskatchewan Ministry of Environment continues to track, report and follow-up with waterworks owners on compliance with sample submission and water quality standards.

**Planned Activity: Implement a “cluster strategy” to establish regional anchors from which water services are delivered. This business growth allows for the more cost-efficient and effective delivery of services compared to service provision on a one-off basis. Continue seeking to expand the customer base for its existing regional water supply systems. [SaskWater]**

SaskWater continues to develop business proposals/solutions with its municipal, industrial and community clients with a focus on growing its service areas through regional systems from which water services are delivered. This strategy allows for more cost-efficient and effective delivery of services compared to service provision on a one-off basis.

SaskWater provides services in eight potable and non-potable regional locations and in five standalone communities. In total, SaskWater owns seven water treatment plants, 31 water pump stations and over 800 kilometres of pipeline. Through this regional network, the company provides potable and non-potable water to 53 urban and rural municipalities, 41 commercial/industrial customers and 60 rural pipeline groups.

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To improve the monitoring of its regional locations, SaskWater partnered with TransGas to make use of TransGas' supervisory control and data acquisition (SCADA) network. Implementation of an enhanced remote monitoring and control system in all of SaskWater's owned and contracted systems is intended to achieve a number of strategic goals over the long term. The goals include improved water quality, reduction of risk and increased operating efficiencies. SaskWater opened the SaskWater Control Centre in 2007, using Supervisory Control And Data Acquisition (SCADA) to remotely monitor water supply and quality parameters 24 hours a day, seven days a week at 33 of SaskWater's owned and contracted facilities.

**Planned Activity: To assist northern municipalities in providing safe drinking water and ensuring sewer systems do not contaminate surrounding areas and water sources: develop and implement phase two of the Northern Water and Sewer Program to address critical needs; continue to provide funding under the Northern Water and Sewer Program and the Northern Emergency Water and Sewer Repair Program; undertake work to develop a regional water and sewer operator program for northern communities; and continue to provide engineering, operating and maintenance advice to northern communities on their water and sewage systems. [Municipal Affairs]**

In 2007-08, \$5.5 million in provincial funding was spent under the Northern Water and Sewer Program in 20 communities, of which \$3.5 million was Canada-Saskatchewan Municipal Rural Infrastructure Fund (MRIF) and Canada-Saskatchewan Infrastructure Program (CSIP) funding. Under the Northern Emergency Program, about \$416,000 was spent in 10 communities on northern water and sewer system repairs that arose during the year. Also, \$494,000 was spent on engineering operating and maintenance advice to northern communities on water and sewer systems. A list of the communities funded under the Northern Water and Sewer Program and the Northern Emergency Program is provided on the Internet ([http://www.saskh20.ca/WaterInformationFactSheet\\_annualreport.asp](http://www.saskh20.ca/WaterInformationFactSheet_annualreport.asp)).

SaskWater plays a role in northern Saskatchewan; planning and managing the design and construction of water and wastewater infrastructure on behalf of the Saskatchewan Ministry of Municipal Affairs. SaskWater provides ongoing technical advice to northern communities for the expansion and maintenance of water and wastewater infrastructure, including responding to community emergencies related to that infrastructure.

SaskWater also works on behalf of INAC to provide operator training to Saskatchewan First Nations. In 2007, SaskWater trained a total of 105 water and wastewater operators at 39 First Nations communities.

**Planned Activity: Continue to provide funding under the MRIF, including new funding announced by the federal government in its 2006 budget, to assist municipalities in providing safe drinking water and ensuring sewer systems do not contaminate surrounding areas and water sources. The Saskatchewan Ministry of Environment provides technical advice to Saskatchewan Ministry of Municipal Affairs in reviewing applications to ensure the projects provide water that meets drinking water quality standards. [Municipal Affairs and Environment]**

In 2007-08, under the MRIF, \$9 million in federal and provincial funding was approved for 34 water and sewer projects and \$14.9 million was paid out to 72 water and sewer projects under the program. A list of 2007-08 approved projects for MRIF water and sewer projects is available on the Internet ([http://www.saskh2o/WaterInformationFactSheet\\_annualreport.asp](http://www.saskh2o/WaterInformationFactSheet_annualreport.asp)).

During the 2007-08 fiscal year, the Saskatchewan Ministry of Environment's participation in the grant review committee in a technical advice capacity proved effective in helping to ensure that drinking water meets water quality standards and that the overall goals of safe drinking water are advanced.

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**Planned Activity: Negotiate with the federal government longer-term municipal infrastructure funding, where water and sewer projects would be funded within the context of all municipal infrastructure needs and priorities. [Municipal Affairs]**

Saskatchewan and the federal government signed an Infrastructure Framework Agreement on April 11, 2008, that commits Canada to invest a minimum of \$635 million in Saskatchewan over seven years. The Building Canada Communities Component, which is one program under the Framework Agreement, will provide a total of \$189 million in federal-provincial funds to Saskatchewan communities with populations under 100,000. Saskatchewan Ministry of Municipal Affairs will consult with municipalities over the course of further negotiations with the federal government to determine the appropriate distribution of funds towards water and sewer projects through the Communities Component Agreement over the next seven years.

**Planned Activity: The CSIP funding was intended to be completed by March 31, 2006; however, funding will continue to be paid out, as they are completed, for water and sewer projects to the end of 2007-08. [Municipal Affairs]**

Under the CSIP, \$4.5 million in federal and provincial funding was spent on 19 water and sewer projects. For the 2008-09 fiscal year, responsibility for the CSIP program has been transferred to the Saskatchewan Ministry of Highways and Infrastructure, which will pay out the remaining \$200,000 of CSIP funding to three water and sewer projects.

In terms of the status of drinking water in Saskatchewan, the bacteriological quality of water is a critical element, because when the related standards are exceeded there is a possibility of rapid significant health effects for consumers. Implementation of water quality standards continues through permitting, inspection and follow-up on monitoring results. Saskatchewan uses coliform bacteria as an indicator of the quality of drinking water. Monitoring of drinking water for *Escherichia coli* (*E. coli*) is increasing in prevalence in North America and the Saskatchewan Ministry of Environment is tracking and implementing this change. The Saskatchewan Disease Control Laboratory and the Saskatchewan Research Council employed routine analysis for *E. coli* during the fiscal year to help in improving the meaning and rapidity of monitoring results. Saskatchewan's standards for bacteriological drinking water quality are more stringent than the Guidelines for Canadian Drinking Water Quality. The ministry commenced examination of the potential for application of presence-absence testing methodologies for use in the province. The number of samples required for bacteriological water quality monitoring of a waterworks is based on the number of people served by the system (see Municipal Drinking Water Quality Monitoring Guidelines at <http://www.SaskH2O.ca/foroperators.asp>) or directly to the PDF file: <http://www.saskh20.ca/DWBinder/EPB202MunicipalDrinkingWaterQualityGuidelinesEdition3.pdf>. When a routine water sample shows the presence of bacteria, follow-up activities including repeat sampling are performed. The Saskatchewan Ministry of Environment issued three Precautionary Drinking Water Advisories (PDWAs) and five EBWOs during 2007-08 when bacteriological related problems arose at waterworks

During 2007-08, there were 23,662 valid routine bacteriological water quality samples submitted of which 223 samples (0.94 per cent) exceeded the water quality standards of zero total coliforms, zero fecal coliforms or greater than 200 background bacteria per 100 millilitres of water. During 2007-08, a total of 23,662 out of 22,839 (103.6 per cent) of the required regular samples for bacteriological water quality were submitted from waterworks regulated by the Saskatchewan Ministry of Environment. During 2006-07, there were 21,151 out of 21,772 (97.14 per cent) of the required regular samples for bacteriological water quality were submitted from waterworks regulated by the Saskatchewan Ministry of Environment. The increase in total sample submission in 2007-08 resulted from 258 facilities submitting more than 100 per cent of required samples during 2007-08.

There were 153 waterworks in the province that exceeded the bacteriological standards at least one time during 2007-08. During the same time period, there were two waterworks that had 50 per cent of their routine bacteriological water samples show the presence of bacteria (Baildon Hutterite Colony and Antler). Four locations had between 25 and 38 per cent of their routine samples exceed the bacteriological water quality standards (Togo, Baildon Hutterite Colony, Lake Alma and Hidden Ridge Country Estates). A total of 12 regulated waterworks had greater than 10 per cent of their regular bacteriological samples test positive during the fiscal year. See Figure 3 for more information on the performance of waterworks regulated by the Saskatchewan Ministry of Environment in meeting bacteriological water quality standards.

Turbidity is a measure of the “cloudiness” of water and is an indirect measure of the number of suspended particles in water. Turbidity is a good indicator of the effectiveness of a water treatment system and is important because turbid water can harbor disease-causing organisms. If excessive turbidity is present, the effectiveness of disinfection of drinking water can be impaired. Turbidity monitoring of Saskatchewan Ministry of Environment regulated waterworks is required at least on a daily basis as a means to track water treatment system performance.

The Saskatchewan Ministry of Environment now has standards for turbidity consistent with the Canadian national standards for turbidity. These standards continue to be phased-in for existing waterworks and take effect upon the start-up of any new waterworks. During phase-in of the turbidity standards, the ministry generally applied a turbidity standard of 1.0 Nephelometric Turbidity Units (NTU) for existing waterworks.

During the 2007-08 fiscal year, on-site monitoring for turbidity and record keeping continued to be required and these records were checked during site inspections by Environmental Project Officers (EPOs).

During 2007-08, Saskatchewan Ministry of Environment staff continued to ensure that waterworks owners and operators track turbidity-monitoring results and manage turbidity related water quality problems. There were 12 PDWAs issued during 2007-08 when turbidity related problems arose at waterworks. Turbidity testing results are being reported in conjunction with information submitted with regular bacteriological samples.

The range of turbidity results tested by all agencies in 2007-08 (municipal, private and government owners) is shown in Table 4.

**Table 4: Range of Turbidity Testing Results – 2007-08**

<b>Turbidity Range (NTU)</b>	<b>Samples</b>	<b>Per Cent Samples</b>	<b>Systems*</b>
0 – 1	22,097	91.14 %	657
1 – 2	1,277	5.27 %	258
2 – 3	370	1.57 %	92
3 – 4	202	0.83 %	54
4 – 5	119	0.47 %	33
5+	180	0.72%	77
<b>Totals</b>	<b>24,245</b>	<b>100 %</b>	

\* Some systems had turbidities in more than one range of turbidity values.

Source: Saskatchewan Ministry of Environment - Environmental Management System

Disinfection is widely used in Saskatchewan and Canada as one of the key methods to prevent the spread of waterborne disease. Most disinfection of drinking water in the province is performed using chlorine-based products. Waterworks regulated by the Saskatchewan Ministry of Environment are required to maintain:

- a) a free chlorine residual of not less than 0.1 milligrams per Litre (mg/L) in the water entering a distribution system; and

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- (b) a total chlorine residual of not less than 0.5 mg/L or a free chlorine residual of not less than 0.1 mg/L in the water throughout the distribution system.

Chlorine disinfectant monitoring usually includes two tests: total chlorine residual and free chlorine residual which are done from samples collected from the water distribution system. Free chlorine residual in drinking water is important in providing lasting protection in water distribution systems.

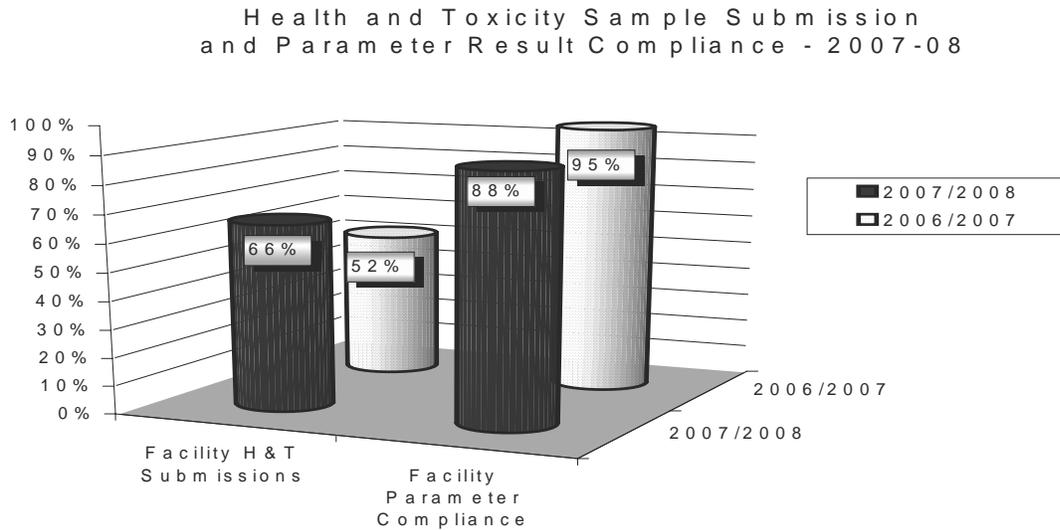
Total chlorine residual is helpful for waterworks operators to understand the effectiveness of disinfection and to judge cleanliness of the water distribution system. On-site monitoring for chlorine residual and associated record keeping is required and these records are checked during site inspections by Saskatchewan Ministry of Environment's EPOs. During 2007-08, the ministry issued eight PDWAs as a result of chlorination related concerns or problems at waterworks. Ministry staff continue to emphasize the need for waterworks operators to monitor and track chlorine residual as a means to help ensure water quality. Improved compliance with disinfection requirements has resulted in a reduction in the number of PDWAs or EBWOs being issued.

Chlorine residual test results are reported in conjunction with information submitted with regular bacteriological samples. These measurements are taken at the same location as for bacteriological sampling and represent chlorine residuals in the distribution system. As previously noted, a total chlorine residual of not less than 0.5 mg/L or a free chlorine residual of not less than 0.1 mg/L must be maintained in distribution system free chlorine or total chlorine residuals within regulatory limits 90 per cent of the time for an overall reported compliance rate of 98.33 per cent. See Figure 4 for more information on the performance of waterworks regulated by the Saskatchewan Ministry of Environment in meeting disinfectant level requirements.

The Saskatchewan Ministry of Environment used the Guidelines for Canadian Drinking Water Quality as the basis for the water quality standards found in *The Water Regulations, 2002*. These standards are included in each new or renewed waterworks permit. Permitting for municipal waterworks continued though the 2007-08 fiscal year. A total of 227 waterworks operational permits were issued, renewed or amended. The drinking water quality standards are being phased-in over the next two to four years for existing waterworks and take effect upon the start-up of any new waterworks. Another 124 wastewater works permits were also issued, renewed or amended during the reporting period.

In terms of the status of drinking water in Saskatchewan, the "health and toxicity" water quality parameters include a range of naturally occurring substances (i.e. arsenic, barium, boron, lead, nitrate, selenium, uranium, etc) and other substances such as trihalomethanes, which may be produced during chlorine based disinfection processes. These substances may represent a very small potential for adverse health effects to consumers over longer time periods. The safety gains associated with disinfection of drinking water to eliminate microbial water quality threats far outweighs any possible adverse health risks associated with disinfection by-products. A complete listing of the health and toxicity substances monitored at Saskatchewan Ministry of Environment regulated waterworks is available at <http://www.SaskH2O.ca/foroperators.asp> (see Municipal Drinking Water Quality Monitoring Guidelines or directly to the PDF file: <http://www.saskh2o.ca/DWBinder/EPB202MunicipalDrinkingWaterQualityGuidelinesEdition3.pdf>). Implementation of these water quality standards is achieved through permitting, inspection and follow-up on monitoring results. For existing waterworks, a regulatory phase-in period requires that all works meet health and toxicity standards by December 2008 (population of 5,000 or more) or by December 2010 (population of less than 5,000). Figure 2 depicts compliance with sample submission requirements and testing compliance for Health and Toxicity parameters during the 2007-08 fiscal year.

**Figure 2: Health and Toxicity Sample Submission and Parameter Result Compliance – 2007-08**



Source: Ministry of Environment – Environmental Management System

Figure 2 provides a representation of both sample submission compliance as well as compliance with Health and Toxicity water quality parameters based on routine samples submitted by Ministry of Environment permitted waterworks. Based on the available information from the 2007-08 fiscal year, 66 per cent of Saskatchewan Ministry of Environment’s permitted waterworks submitted the required Health and Toxicity samples. Eighty-eight per cent of these waterworks met the drinking water quality objectives for Health and Toxicity related chemicals. Figure 2 shows these results compared to the results for last year. Owners of waterworks not submitting required samples are provided notification on a quarterly basis to ensure long-term compliance with sample submission requirements.

In 2007-08, there were 36 facilities that exceeded at least one Health and Toxicity related chemical standard resulting in a total of 46 exceedences. Table 5 provides a listing of the parameters and number of excursions at all Ministry of Environment regulated waterworks.

**Table 5: Health and Toxicity Parameter Specific Excursion Totals for Ministry of Environment Regulated Waterworks – 2007-08.**

Parameter	Number of Excursions in 2007-08
Arsenic	6
Barium	0
Boron	1
Nitrate	1
Lead	3
Selenium	4
Uranium	32

Source: Ministry of Environment – Environmental Management System

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During the 2007-08 fiscal year, 11 facilities exceeded the maximum acceptable concentration for fluoride on 25 sampling occasions. One of these facilities (Ferland) has high, naturally occurring fluoride in their ground water supplies, which accounted for 10 of the 25 exceedences. The Saskatchewan Ministry of Environment monitors results from all systems that artificially fluoridate or have high naturally occurring fluoride.

The present standard for trihalomethanes now being phased-in at existing waterworks is 100 parts per billion based on an average of four seasonal samples. The Saskatchewan Ministry of Environment has completed its examination of this water quality standard in accordance with the federal/provincial/territorial guideline development process and the water quality standard for trihalomethanes will remain at the present level of 100 parts per billion based on an average of four seasonal samples. Due to determination of new scientific research, the Health Canada has indicated it is likely that the new standard for Bromodichloromethane (16 parts per billion) is not warranted and therefore the Saskatchewan Ministry of Environment will not be introducing this standard in the future.

A total of 180 surface water treatment and delivery facilities were required to participate in the trihalomethane monitoring program during the 2007-08 fiscal year, which should result in 738 samples being submitted each year. The actual number of regulated waterworks that submitted samples was 151 (83.88 per cent). A total of 570 samples (77.24 per cent overall submission compliance) were submitted by the facilities. During 2007-08, 123 regulated waterworks (68.33 per cent) submitted 411 samples for analysis that met the maximum acceptable concentration for trihalomethanes in drinking water. During 2007-08, 106 of 180 regulated waterworks (58.88 per cent) produced water that met the trihalomethane objective of 100 ug/L based on the annual average of seasonal sampling.

In addition to progress made on planned activities, other accomplishments included:

SaskWater continues to work with engineering firms and suppliers to develop and apply emerging technologies to provide quality drinking water to its customers. SaskWater partnered with Consulting Engineers of Saskatchewan (CES) on a Technical Exchange Workshop, held in early 2007. Consultants, operators and regulators, including the Saskatchewan Ministry of Environment, met and shared knowledge to the benefit of Saskatchewan's entire water and wastewater industry.

To address the need to upgrade water treatment infrastructure to meet new standards, SaskWater piloted a number of emerging technologies, including pond mill circulators, aeration pretreatment, advance membrane filtration, biological filtration systems and ultraviolet (UV) disinfection.

In 2007, SaskWater pilot tested two Pond Mill Circulators at its raw surface water reservoirs in Edenwold. SaskWater is hoping to improve the raw water quality supplied to the treatment plant by increasing the dissolved oxygen level throughout the water supply reservoir to control the growth of algae.

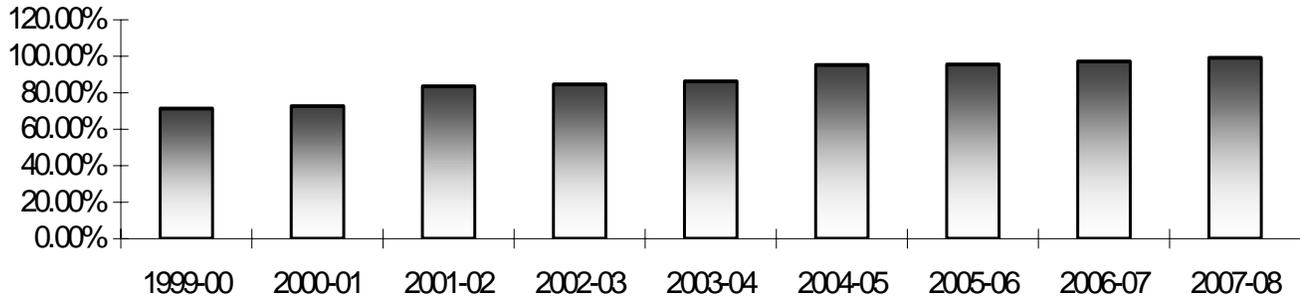
SaskWater has pilot tested biological filtration technology, for a six-month period, at Gravelbourg in 2006 and 2007. The goal is to reduce organic carbon, turbidity, colour, odour, iron, manganese, arsenic and other contaminants from water. Through these different technologies, SaskWater hopes to enhance the quality of drinking water by meeting and exceeding potable water regulatory requirements well into the future.

SaskWater is also investigating the possibility of implementing a UV disinfection system for the Wakaw-Humboldt Regional Water Treatment Plant. UV disinfection can be used to complement chemically assisted filtration and chlorination processes to provide an additional barrier against chlorine-resistant pathogens such as *Cryptosporidium* and *Giardia*.

## Measurement Results

*Per cent of facilities that meet bacteriological guidelines 90 per cent of the time*

**Figure 3: Bacteriological Standards Compliance**



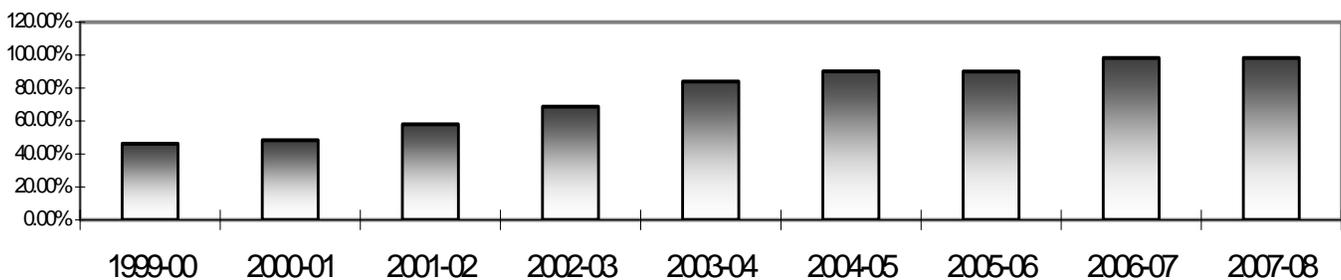
Source: Ministry of Environment – Environmental Management System

There has been a steady increase in compliance with bacteriological water quality standards (90 per cent of the time) over the past five fiscal years with a 12.89 per cent increase in compliance from 86.3 for 2003-04 to 95.2 per cent for the 2004-05 fiscal year to 95.4 per cent for the 2005-06 fiscal year to 97.14 per cent in 2006-07 and to 99.19 per cent in 2007-08. Increases in bacteriological compliance also matches well with low numbers of PDWAs and EBWOs issued in 2007-08 (three PDWAs and five EBWOs – see pages 25 and 26). The steady increase in compliance with standards is the result of increased inspection and follow-up on water quality sampling results by Saskatchewan Ministry of Environment staff as well as increased attention to water treatment and monitoring by waterworks owners and operators.

The bacteriological quality of drinking water is important since contamination of this type can result in significant illness within a short period of time. Compliance with bacteriological water quality standards was selected as a reportable performance measure, since it provides a good indication of drinking water quality, which is important to consumers. Compliance with this measure is primarily controlled by the owner of the waterworks, but also requires cooperation from the waterworks operator(s) in achieving bacteriological water quality compliance. Ongoing inspection and interaction with waterworks owners and operators is planned to sustain good performance in achieving water that is safe from bacteriological threats.

*Per cent of waterworks [regulated by Saskatchewan Ministry of Environment] that meet disinfection requirements 90 per cent of the time*

**Figure 4: Disinfection Standard Compliance**



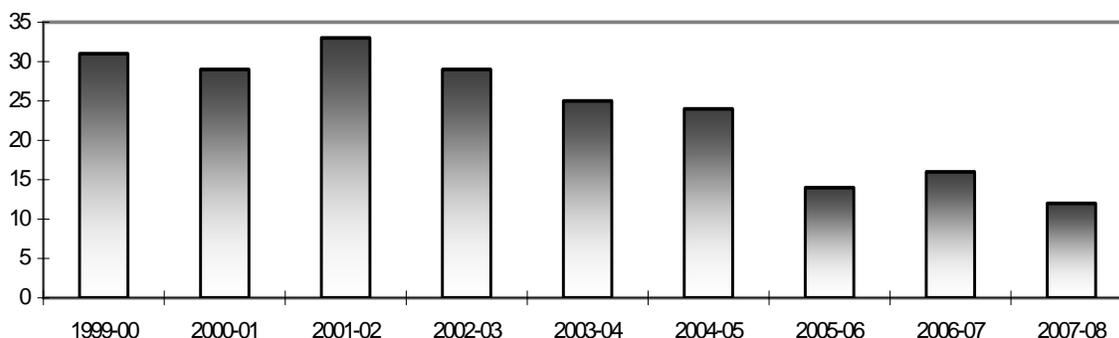
Source: Ministry of Environment – Environmental Management System

There has been a significant increase in compliance with the disinfection standards over the past five fiscal years with a 14.33 per cent increase in compliance from 84 per cent in 2003-04 to 90.2 per cent in 2004-05, to 90.1 per cent in 2005-06, to 98.19 per cent in 2006-07 and to 98.33 per cent in 2007-08. The increase in compliance with the disinfection standards can be directly attributed to an increased field presence by Saskatchewan Ministry of Environment inspection staff and a renewed awareness by waterworks owners and operators of the regulatory requirements.

Proper disinfection of drinking water is one of the most important ways to ensure safe drinking water and prevent the outbreak of waterborne diseases. Compliance with chlorine residual requirements was selected as a measure, since it provides a good indication of drinking water protection, which is important to consumers. Compliance with this measure is primarily controlled by the owner of the waterworks, but also requires cooperation from the waterworks operator(s) in achieving disinfection standards compliance. Ongoing inspection and interaction with waterworks owners and operators is planned to sustain good performance in achieving water that is safe from bacteriological threats and meets disinfection standards.

*Number of waterworks that do not meet Saskatchewan Ministry of Environment's minimum treatment requirements (broken down by pre and post regulatory changes)*

**Figure 5: Number of Waterworks Regulated by Saskatchewan Ministry of Environment that do not Meet Minimum Treatment Requirements.**



Source: Ministry of Environment file information

As of March 31, 2008 there are a net of 12 waterworks that do not meet Saskatchewan Ministry of Environment's minimum treatment requirements, a net decrease of 25 per cent since the previous year when there were 16 such works. Table 6 provides a summary of waterworks not meeting minimum treatment requirements broken down by pre and post regulatory changes. The decrease is the result of ongoing improvements to existing waterworks to correct deficiencies of the water treatment systems. Educational efforts are ongoing as is provision of funding through various funding programs in the past to upgrade works. Saskatchewan Ministry of Environment's educational and compliance efforts will continue during 2008-09 and beyond as a means to reduce the number of waterworks not meeting minimum treatment requirements. The owner of the waterworks primarily controls the achievement of this measure, however the regulator has significant influence through a number of mechanisms. Periodically, as newly regulated waterworks are permitted, inadequacies in water treatment capability are discovered, an increase in newly regulated waterworks not meeting minimum treatment will occur.

**Table 6: Waterworks Not Meeting Minimum Treatment Requirements [broken down by pre and post regulatory changes].**

	March 31, 2004	March 31, 2005	March 31, 2006	March 31, 2007	March 31, 2008	Annual Change
Waterworks regulated before regulatory changes	20	17	9	8	4	↓ 4
Waterworks regulated following regulatory changes	5	7	5	8	8	0
Total	25	24	14	16	12	↓ 4

Source: Saskatchewan Ministry of Environment file information.

The number of waterworks that do not meet minimum treatment requirements is a direct indication of the scale of potential water quality concerns due to infrastructure inadequacies. As of March 31, 2008, human consumptive waterworks that do not meet minimum treatment requirements serve a population of approximately 900 residents or 0.09 per cent of the population of the province (2006 census provincial population of 968,157). The measure was selected since it provides a direct count of the number of waterworks in the province not capable of producing safe drinking water.

The Saskatchewan Ministry of Environment continues to place all regulated waterworks not meeting minimum treatment on PDWAs as a means to protect consumers. The ministry also provides technical advice to communities not meeting minimum treatment requirements to aid waterworks owners to work towards system improvements.

## **Waterworks systems and operations are financially sustainable**

Ensuring the financial sustainability of waterworks is critical in the production of safe drinking water over the long-term. Waterworks deteriorate over time and may need to be expanded or replaced. Municipalities will therefore need to know the condition of their waterworks and put in place pricing and capital investment policies for these systems. Public transparency will aid in ensuring that waterworks systems are sustainable into the future. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that waterworks systems and operations are financially sustainable.

### **Commitments, Activities and Achievements**

**Planned Activity: Monitor annual municipal public reporting on waterworks financial sustainability information beginning September 1, 2006. Public reporting includes whether pricing policies and capital investment strategies have been established and the extent that waterworks revenues cover waterworks expenditures and debt payments. Municipalities use the waterworks system assessments (WSAs) required by the Saskatchewan Ministry of Environment to establish rate policies and capital investment strategies. The public information assists a ratepayer's understanding of the need for, and acceptance of, cost recovery rates. Waterworks with cost recovery rates are more likely to be able to provide safe drinking water. [Municipal Affairs]**

By April 21, 2008, 40 per cent of the municipalities submitted a copy to the ministry of their public information on the financial sustainability of their waterworks for 2006. Of these municipalities, 40 per cent indicated they had in place a waterworks rate policy and capital investment strategy. This was the

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second year the regulations were in effect. Saskatchewan Ministry of Municipal Affairs is currently assessing the policies and procedures for waterworks financial reporting, including how to improve public reporting.

### **Measurement Results**

*Number and percentage of municipalities that have reported waterworks information on the financial sustainability of their systems and number and percentage of municipal waterworks that have reported that have rates that cover waterworks expenditures and debt payments*

Of the municipalities that submitted their public waterworks information to the ministry, 46 per cent reported waterworks revenues that covered the waterworks expenditures and debt payments.

Waterworks rates that cover waterworks expenditures and debt payments are a direct indicator of waterworks financial sustainability. The public reporting regulations facilitate consumers' understanding of the need for, and possibly acceptance of, waterworks rates that cover waterworks costs.

Saskatchewan Ministry of Municipal Affairs requires municipalities to establish a long-term financial sustainability plan for their waterworks in order to receive infrastructure funding for their waterworks.

Lack of municipal capacity will limit some smaller municipalities from establishing these waterworks policies and strategies.

SaskWater supports the movement towards full-cost pricing of water and wastewater services in Saskatchewan. To improve its customer's rate's, SaskWater is undergoing a cost of service rate study to determine rates required across its Service Areas and customer types. SaskWater is currently in year two of its cost of service rate study, which will be used to prepare a set of recommendations for future water utility rates. Under the cost of service model, all costs to operate, maintain and upgrade the water and wastewater systems are to be recovered from customers in a fair and equitable manner.

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### **Key Area: The drinking water regulatory system is clear and effective**

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#### **Regulations are clear and ensure that health and drinking water quality will be protected**

Provision of safe drinking water is reliant on regulatory requirements that are clear and communicated to owners and operators of waterworks. Additionally, accepted standards and practices are required to ensure requirements are achieved in the proper manner. Program delivery and related policies are necessary to track and ensure that regulatory requirements are being met. Collectively, these measures will help to ensure that drinking water is safe and that wastewater effluent discharges do not threaten the quality of source waters or adversely impact the environment. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that regulations are clear and ensure that health and drinking water quality will be protected.

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## Commitments, Activities and Achievements

### **Planned Activity: Implement and track mechanisms to clarify and simplify regulatory requirements for owners of waterworks to advance compliance and water safety. [Environment]**

In March 2007 the Saskatchewan Ministry of Environment commenced implementation of regulatory changes that were directed at aiding small waterworks to provide safe and affordable drinking water. Revisions reduce the frequency of Waterworks System Assessments (WSAs), ease certification requirements for sewage works system operators and reduce requirements for formal operator certification at communities serving less than 50 persons with deep, protected groundwater supplies. Legislative amendments significantly reducing the requirements for interest and easement registration were completed in April 2007 and implementation began in the 2007-08 reporting period.

### **Planned Activity: Examine and determine the need to address gaps in drinking water regulatory framework involving the use of private wells in municipal or sub-division settings. [Environment, Municipal Affairs, Health and Saskatchewan Watershed Authority]**

The new *Planning and Development Act, 2007* requires that municipal land use policies on source water protection be included in the new Official Community Plans (OCP). Also, statements of provincial interest in land use that are under development by the government may include source water protection measures and they will apply to subdivision decisions made in the absence of an OCP. Future provincial regulations regarding private or communal water wells may be implemented through local bylaws and incorporated into the statements of provincial interest.

During the 2007-08 fiscal year, the Saskatchewan Ministry of Environment continued to advocate the use of communal waterworks in municipal and subdivision settings through provision of comments on subdivision applications referred to the ministry. Formal discussion of policy and requirement regarding the need for communal waterworks in areas with denser population was advanced through inter-ministry meetings during the reporting period.

During the summer of 2007, a survey of private wells in the Town of Pilot Butte was conducted. The survey that was lead by the Regina Qu'Appelle Health Region in collaboration with the Saskatchewan Ministry of Health and the Saskatchewan Watershed Authority obtained information on water quality in the wells, household usage of the water and well owner knowledge of proper well maintenance and operation. The Health Region is working with the Town of Pilot Butte to ensure that *The Public Health Act, 1994* requirement for a supply of potable water is complied with.

To address concerns regarding the impact of onsite-waste water systems on ground water, the Saskatchewan Ministry of Health is currently developing an approach that will require additional assessments of subdivision suitability for usage of onsite wastewater systems.

Further discussions will take place to determine if amendments to legislation are necessary to address private water supplies and onsite wastewater systems in municipalities or subdivision settings.

### **Planned Activity: Work will continue with SUMA, SaskWater, consulting engineers and others to implement a program to facilitate waterworks assessment in the province. WSAs will continue to be provided to waterworks owners to inform them of the requirements and timelines of the assessment process. [Environment]**

During the 2007-08 fiscal year, the Saskatchewan Ministry of Environment commenced implementation of regulatory revisions which reduced the frequency of waterworks system assessments at small and very small municipal waterworks reliant on secure groundwater sources. Waterworks owners were advised of these changes during the reporting period. The ministry continued to support the strategic

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partnership formed between SUMA and SaskWater to facilitate completion of WSAs early in 2007-08. Where WSAs were still required, the Saskatchewan Ministry of Environment continued to promote the value of WSAs by a variety of means such as convention workshops, discussions with waterworks owners and through inspections. Further information on WSAs is available on the internet (<http://www.saskh20.ca/DWBinder/EPB233WaterworksSystemAssessmentStandards.pdf> ).

**Planned Activity: Semi-public water systems are regulated through *The Health Hazard Regulations*. Compliance with these regulations is monitored through inspections of the semi-public water systems, ensuring that the operators are routinely sampling the water supply and reviewing water quality test results. All health regions with the exception of the far north (Mamawetan Churchill River Health Region) will be striving for 100 per cent inspections of their public water supplies. Due to the geographic location of semi-public water systems in the north (access only by plane/boat), the Mamawetan Churchill River Health Region (MCRHR) will be using a risk-based approach for prioritizing inspections of water supplies that they regulate. [Health and Regional Health Authorities]**

During the fiscal year, Health Region public health inspectors inspected 1,151 public water supplies that fall under *The Health Hazard Regulations*.

**Planned Activity: Inspect waterworks across the province at a frequency of up to two inspections at each surface water and priority groundwater waterworks (based on compliance – minimum one inspection per year) and one inspection at every other regulated waterworks. Supplemental education and prevention activities will be delivered during inspections to help ensure waterworks meet operational and treatment requirements. Inspection protocols for ministry staff will be kept current for new water treatment technologies. [Environment]**

During 2007-08, the Saskatchewan Ministry of Environment staff continued to conduct waterworks inspections in accordance with the ministry inspection protocol and targets. A total of 842 waterworks inspections were conducted during the reporting period. During waterworks inspections, the need for activities or upgrading to meet drinking water quality standards and requirements are stressed by Environmental Project Officers (EPO's). During 2007-08, added emphasis was placed on meeting upset reporting requirements and the pending turbidity standards so that waterworks owners were informed well in advance of the December 2008 compliance deadline for waterworks serving less than 5,000.

Components of the Drinking Water Information Binder and SaskH2O website are updated regularly by the Saskatchewan Ministry of Environment to keep owners and operators current with operational requirements and newly emerging information. During 2007-08, nine new documents on water or wastewater related were prepared and another 46 publications were updated. Work was underway on another 15 guidelines or protocols as of March 31, 2008. The results of waterworks inspections can be found on line at <http://www.saskh2o.ca/MyDrinkingWater.asp>. Having inspection results on line is intended to increase transparency and public trust in drinking water supplies and the associated regulatory processes.

Waterworks inspections are carried out by the EPOs and are the most important point of contact and compliance mechanism to ensure proper management of drinking water. During a three-year cycle, at least one inspection will be unannounced. Water sources such as wells or surface water intakes are re-inspected every second year. Table 7 summarizes the findings of key elements for inspections conducted during the 2007-08 fiscal year.

**Table 7: Waterworks Inspection Finding Summary.**

<b>Inspection Element</b>	<b>Non-Compliant</b>	<b>N/A or No Response*</b>	<b>Compliant</b>
Disinfection continuous at plant	13	32	797
Disinfection Free chlorine > or = 0.1 mg/L leaving the plant	86	54	702
Monitoring daily chlorine	54	20	768
Reservoirs in good repair	15	94	733
Water treatment plant in clean and orderly condition	14	40	788
A total chlorine residual not <0.5 mg/l or a free chlorine residual not <0.1 mg/l in the distribution system	119	21	702
Bacteriological testing after completion, alteration, extension or repair	14	53	775
Reporting of chlorine upsets	64	45	733
Record keeping	56	56	730

\* N/A = Non-applicable. Some waterworks inspected do not have a treatment plant such as pipeline systems. These may be recorded as N/A or No response.

Source: Ministry of Environment – Environmental Management System

**Planned Activity: Revise the Bacteriological Follow-up Protocol, Contaminated Drinking Water Follow-up Protocol and other protocols, guidelines and fact sheets as needed to reflect evolving requirements, science and developments which could affect water safety. [Environment]**

The Bacteriological Follow-up Protocol for Waterworks Regulated by the Saskatchewan Ministry of Environment EPB 205 was reviewed in the 2007-08 fiscal year. Beyond minor revisions to staff contact information, the review revealed that technical sections of the document were up-to-date with emerging national water advisory guidance documents.

The Bacteriological Follow-up Protocol for Waterworks Regulated by the Saskatchewan Ministry of Environment EPB 205 provides for the issuance of PDWAs by the ministry when there is a concern that problems (due to microbial or chemical contamination) may exist. Ministry staff also use a protocol for upset reporting and follow-up to protect consumer health and drinking water quality. Waterworks owners and operators continue to be advised of upset reporting requirements during inspections. A total of 114 unexpected upsets at waterworks regulated by the Saskatchewan Ministry of Environment were reported and addressed during 2007-08 due to problems such as system depressurizations due to power loss or water main breaks, low chlorine residuals, excessive turbidity/operational problems, positive bacteriological monitoring results, chemical contamination or other failures and resulted in issuance of a PDWA or EBWO. A total of 78 PDWAs were issued due to anticipated events such as startup of seasonal or new waterworks or planned maintenance activities.

EBWOs are issued by Health Region officials to deal with confirmed public health threats such as microbial contamination of drinking water. Tables 8 and 9 outline statistics for PDWAs and EBWOs issued for Saskatchewan Ministry of Environment and Health Region regulated waterworks during the 2007-08 fiscal year.

**Table 8: EBWO/PDWA Statistics for 2007-08 – Saskatchewan Ministry of Environment Regulated Waterworks.**

<b>Time</b>	<b>EBWO</b>	<b>PDWA</b>
In Effect Prior to Reporting Period	2	59
Added During the Reporting Period	5	194
In Effect at End of Reporting Period	1	58

Source: Ministry of Environment file information

**Table 9: EBWO/PDWA Statistics for 2007-08 – Health Region Regulated Waterworks.**

<b>Time</b>	<b>EBWO</b>	<b>PDWA</b>
In effect prior to reporting period	38	22
Added during the reporting period	49	78
In effect at end of reporting period	44	67

Source: Information provided by the Health Regions in Saskatchewan

Tables 10 and 11 provide information regarding the reasons for PDWAs and EBWOs issued during the 2007-08 fiscal year for waterworks regulated by the Saskatchewan Ministry of Environment and Health Regions, respectively. Further information on the nature of a PDWA and EBWO issued during 2007-08 by the Saskatchewan Ministry of Environment is available from the ministry or on the Internet (<http://www.saskh2o.ca/advisories.asp>).

**Table 10: Reason for Issuing PDWAs During 2007-08 – Ministry of Environment Regulated Waterworks.**

<b>Reason for issuance of PDWA</b>	<b>Number</b>
Startup of waterworks	36
Inadequate chlorine residual	5
Planned maintenance of system	6
Un-planned depressurization of system	79
Planned depressurization	11
Maintenance and depressurization	19
Flooding	5
Positive bacteriological monitoring results	2
Positive <i>E. coli</i>	1
Lacks minimum treatment	2
High turbidity	11
No chlorination and certified operator	1
New system start-up	6
Chlorination equipment failure	2
Line leak	1
Maintenance followed by high turbidity	1
Raw water line break	1
Surface water infiltration to treated water reservoir	1
Sewage line break nearby	1
Unknown water quality	1
Other causes	2
<b>Total</b>	<b>194</b>

<b>Reasons for issuance of EBWO during 2007-08</b>	<b>Number</b>
Detected presence of <i>E. coli</i>	2
Detected presence of <i>E. coli</i> and total coliforms	1
Detected presence of pathogens	1
Detected presence of <i>E. coli</i> in Hygienic waterworks	1
<b>Total</b>	<b>5</b>

Source: Saskatchewan Ministry of Environment file information

**Table 11: Reason for Issuing EBWOs and PDWAs During 2007-08 – Health Region Regulated Waterworks.**

<b>Reasons for issuance of EBWO during 2007-08</b>	<b>Number</b>
Positive <i>E. coli</i> results	47
Positive bacti results	2
<b>Total</b>	<b>49</b>
<b>Reason for issuance of PDWA</b>	<b>Number</b>
Supply unsafe water-miscellaneous	4
Startup of waterworks	1
Positive bacti results	69
Lack of minimum treatment	4
<b>Total</b>	<b>78</b>

Source: Information provided by the Health Regions in Saskatchewan

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**Planned Activity: Continue to implement the water and wastewater compliance and enforcement protocol to attain compliance with drinking water regulatory requirements. Ministry technical staff will receive ongoing new compliance and enforcement related training during 2007-08. [Environment]**

Saskatchewan Ministry of Environment's Drinking Water and Wastewater Enforcement Protocol EPB 222 continues to provide direction and guidance for EPO to ensure uniform, effective and efficient compliance and enforcement practices are followed in dealing with non-compliance for drinking water and wastewater related violations. Protecting public health, safety of people and the environment is the overall purpose. The enforcement protocol requires that compliance be obtained through the use of public education and prevention as initial priorities while enforcement is a tool of last resort. Compliance related actions might also be applied when an issue is causing, or may cause a significant risk to public health and safety or the environment. During 2007-08, the ministry continued to provide compliance related training for new and existing staff members. The Drinking Water and Wastewater Enforcement Protocol EPB 222 was reviewed so it remains current.

During 2007-08, implementation of the enforcement and compliance protocol continued and was integral in gaining compliance in problematic or difficult situations. Forty-six written warnings were issued for waterworks and sewage works related infractions. As well, two waterworks protection orders and one emergency sewage works protection order have been issued to non-compliant parties. Four charges have been laid for waterworks related infractions. There were four convictions registered for waterworks related offences. The nature of water and wastewater related infractions encountered during the reporting period are summarized in Table 12.

#### **Verbal Warnings**

Verbal warnings are issued for minor offences encountered during inspection duties. Verbal warnings are documented on inspection forms used by inspection staff.

#### **Written Warnings**

Written warnings consist of letters of non-compliance and notices of violation. Written warnings are issued for non-compliance detected during inspections or when follow-up requirements identified through previous inspections or correspondence was not complied with. During 2007-08, 46 written warnings were issued to waterworks or sewage works owners. Table 12 provides a breakdown of the infraction details.

Typically, the waterworks owners address all verbal and written warnings in a short time period. Ministry staff follow-up by repeat contacts or inspections to ensure warnings are addressed and protection of water quality is assured.

#### **Waterworks Protection Orders and Sewage Works Protection Orders**

Waterworks Protection Orders are issued to a person responsible for a waterworks, if in the opinion of the Minister of Environment, it is necessary to do so to protect human health or the environment. Sewage Works Protection Orders are issued to a person responsible for a sewage works, if in the opinion of the Minister of Environment, it is necessary to do so to protect human health or the environment. Based on ongoing implementation of Saskatchewan Ministry of Environment's Enforcement and Compliance Framework, the ministry will always pursue prosecution when a Protection Order is not complied with. Two Waterworks Protection Orders were issued during the reporting period. Orders were issued to address non-compliance with sampling frequency and failing to disinfect by continuous chlorination. One Emergency Sewage Works Protection Order was issued during the reporting period to address mitigation of a sewage spill. Table 12 provides a breakdown of infraction details. The ministry follows up on protection orders to ensure that problems are ultimately resolved.

## Prosecutions

Four charges were laid during 2007-08 for waterworks related infractions pursuant to *The Water Regulations, 2002*. Prosecution will only be used when prevention, education and other enforcement tools do not compel the violator to comply with legislation. All four charges laid resulted in convictions of the accused. Table 12 provides a breakdown of infraction details.

**Table 12: Enforcement and Compliance Activities-Drinking Water/Wastewater 2007-08.**

Infraction	Written Warnings Issued	Ministerial Orders Issued	Charges Laid	Convictions	Alternative Measures
Fail to report upset condition at waterworks	4		1	1	
Fail to report chlorination equipment malfunction			1	1	
Fail to clean up sewage spill		1			
Fail to report upset condition at sewage works	3				
Improper record keeping	2		1	1	
Fail to do required testing/sampling	12	1			
Chlorine residuals below minimums	3		1	1	
Fail to cause continuous chlorination	2	1			
No annual notice supplied to consumers	1				
Inadequate sewage lagoons	2				
Fail to keep water treatment plant in a clean and orderly state	1				
Construction on waterworks without permit	2				
Discharge sewage without approval	4				
No certified operator	6				
Fail to complete waterworks system assessment	2				
Improper posting of hygienic water sources	1				
No monthly review of records	1				
<b>Total</b>	<b>46</b>	<b>3</b>	<b>4</b>	<b>4</b>	

Source: Saskatchewan Ministry of Environment – Resource Intelligence Program database.

The Saskatchewan Ministry of Environment issued 197 new or renewed waterworks operational permits during 2007-08 as a means to ensure waterworks technology and requirements keep pace with new developments and in order to help protect consumer health and drinking water quality. A total of 30 pre-existing waterworks permits were amended. Another 124 wastewater works operational permits were also issued, renewed or amended during the 2007-08 fiscal year. A total of 245 permits to construct or upgrade waterworks (142) and sewage works (103) were issued or amended over the 2007-08 reporting period. Comprehensive permitting protocols for human consumptive and hygienic waterworks were reviewed and revised and are used by Saskatchewan Ministry of Environment staff in permitting waterworks in the province. Permit application materials were revised during the reporting period and are available on the internet at <http://www.saskh20.ca/foroperators.asp> under the heading “Forms”. Legislative changes affecting and simplifying the requirement for interest and easement registration were completed early in the 2007-08 fiscal year and have reduced the cost and burden of registering interest and easements for waterworks and most sewage works system improvements in the future.

For the period of this report (April 1, 2007 to March 31, 2008), a total of 43,215 drinking water samples were processed using the DC media by the Saskatchewan Disease Control Laboratory in Regina. A breakdown indicated that 72 per cent of the samples for water supplies were from the Saskatchewan Ministry of Environment, 15 per cent were from private customers and 13 per cent of the water were from Saskatchewan Ministry of Health/Health Regions.

## Measurement Results

*Number of accredited drinking water testing laboratories*

**Table 13: Number of accredited drinking water testing laboratories**

March 2002	March 2003	March 2004	March 2005	March 2006	March 2007	March 2008	Annual Change
1	2	4	6 (all labs)	6 (all labs)	6 (all labs)	6 (all labs)	0

Source: Standards Council of Canada web ([http://www.scc.ca/en/news\\_events/notices/lab.shtml](http://www.scc.ca/en/news_events/notices/lab.shtml))

Laboratory accreditation indicates that the laboratory has a quality system that is documented, communicated, understood, implemented and incorporates adequate review, audit and internal quality control and ensures accurate analytical results. Laboratory accreditation was selected as a measure to help gauge results in ensuring safe drinking water for Saskatchewan residents. As of March 31, 2008, all six laboratories located in Saskatchewan that perform analysis of drinking water samples retained accreditation by the Standards Council of Canada or the Canadian Association for Environmental Analytical Laboratories in accordance with regulatory requirements (Table 13). Accredited laboratories include: Saskatchewan Ministry of Health – Saskatchewan Disease Control Laboratory, Saskatchewan Research Council, ALS Laboratory Group, BDS Laboratories, the City of Saskatoon Laboratory and the Buffalo Pound Filtration Plant laboratory. Any other water laboratories in operation in Saskatchewan do not serve waterworks regulated by the Saskatchewan Ministry of Environment. In Saskatchewan, waterworks regulated by the Ministry of Environment are required to use and accredited laboratory for drinking water testing. Compliance with this requirement is very high.

## Professional regulatory staff have access to the tools necessary to ensure compliance

Provision of safe drinking water is reliant in part on the training and tools that staff can access. The tools take the form of working agreements, computerized information systems as well as examples, guidelines and education information needed to deliver programming. Staff qualifications must also be assured and kept current with new or evolving water management processes. Collectively, these tools help to ensure that drinking water is safe and that wastewater effluent discharges do not threaten the quality of source waters or adversely impact the environment. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that professional regulatory staff have access to the tools necessary to ensure compliance.

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## Commitments, Activities and Achievements

**Planned Activity: Discussions will be held between officials (Environmental Project Officers, Medical Health Officers and Public Health Inspectors) to strengthen integration and exchange information on provincially regulated systems. [Environment]**

Staff from the Ministries of Environment and Health continues to discuss and consider items such as the Bacteriological Follow-up Protocol EPB 205 and steps for implementation of hygienic systems and a means to ensure drinking water protection. Saskatchewan Ministry of Environment program delivery staff and managers held meetings with Health Region representatives during 2007-08 fiscal year to discuss drinking water and wastewater related programming, progress and waterworks specific concerns in their particular service regions. Collectively, Saskatchewan Ministry of Environment and Saskatchewan Ministry of Health continue to coordinate activities for the Safe Drinking Water Strategy with other participating ministries through a Policy and Programs Subcommittee.

**Planned Activity: Further enhancement of the Environmental Management System (EMS) will be undertaken to support drinking water management, compliance activities and handle ever-increasing demand for data and information. Improvements include a reduction in the time needed to post information on water quality on the SaskH2O.ca website during 2007-08. [Environment]**

With the implementation of the EMS, EPOs have transitioned from a "paper and file" record-keeping model to a modern information system that enables immediate checking of waterworks performance and potential environmental risk to water quality. EMS drinking water information is also fed into the public website SaskH2O.ca, launched in June 2003, where citizens are able to check on current and historic water quality in their community. As of March 2008, the website has had an average of 249 visits per day with an average stay on the website of approximately 25 minutes. A total of 289,082 visits have been recorded since the website went live. Visitors, on average, return 2.6 times to SaskH2O.ca.

Automated data links now exist between laboratories analyzing water samples and EMS. There is only a one-day turn around between the time a laboratory sends the ministry water sample results and the results are stored in EMS.

**Planned Activity: Examine timing issues with respect to northern Regional Health Authority (RHA) water sample testing. [Health]**

Findings of review conducted on the northern Regional Health Authority water sampling indicated that timing issues were not an issue, instead funding should be allocated to support water sampling, operator education and on-site inspections of health regulated public water supplies in the area covered by Mamawetan Churchill River, Keewatin Yathe and Athabasca health authorities

## Measurement Results

*Number and average duration of visits to the [www.saskh2o.ca](http://www.saskh2o.ca) website*

June 21, 2003 to March 31, 2004\*: 27,015 visits; 7 minute and 28 second average duration  
April 1, 2004 to March 31, 2005: 49,862 visits; 7 minute and 55 second average duration  
April 1, 2005 to March 31, 2006: 58,837 visits; 7 minute and 24 second average duration  
April 1, 2006 to March 31, 2007: 68,834 visits; 10 minutes and 53 seconds average duration  
April 1, 2007 to March 31, 2008: 91,418 visits; 25 minutes and 43 seconds average duration

\*SaskH2O.ca website launched on June 21, 2003.  
Source: Webtrends information system

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The number and average duration of visits to the SaskH2O web site is a good measure of the use of tools that help ensure the protection of drinking water. The site and related databases provide easy access to information for Saskatchewan Ministry of Environment officials so that they can more readily perform their duties and track needed information to help ensure safe drinking water. The website also provides access to a variety of fact sheets, guidelines and legislation for waterworks owners, system operators and the public as a means to increase understanding of drinking water quality. The website provides up to date information on water quality for all waterworks that the Saskatchewan Ministry of Environment regulates. Although government controls the content of the website, it cannot directly influence use of the site.

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## **Key Area: High quality source waters are protected now and into the future**

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### **Risks to source water quality are known**

Protection of source water quality is a component of the provision of safe drinking water. Identification of risks to source water quality is the first step in developing actions and strategies to protect source water and minimizing the cost to treat drinking water. Through the watershed planning actions outlined below, it is expected that other risks to source water quality will be identified. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that risks to surface water quality are known.

### **Commitments, Activities and Achievements**

**Planned Activity: Consider comments on the first State of Watershed Report, collect data and consider new indicators for a second State of Watershed Report planned for 2009. [Saskatchewan Watershed Authority]**

Comments and suggestions have been received and work on the 2009 report is underway.

**Planned Activity: Continue assessment to determine the contribution of non-point agricultural sources to water quality and habitat degradation that can be used in the watershed planning activities and to measure the efficacy of Best Management Practices. [Saskatchewan Watershed Authority]**

A study to determine the extent of agricultural non-point source contributions to Saskatchewan's water quality is occurring in the Lower Souris watershed along Pipestone Creek. Funding partners and local contacts are in place. This study involves four principal components: land use assessments, water quality testing, hydrological measurements and evaluation of aquatic biological communities (macroinvertebrates). Land use assessment has been conducted. The first year of water quality sampling, flow measurements and macroinvertebrate evaluation occurred during the spring and summer of 2007. The Authority is currently assessing the 2007 data.

**Planned Activity: Complete annual sewage works inspections to identify which systems represent a risk to source water quality and to ensure sewage works meet operational and treatment requirements. Improvements in wastewater management will be continued through owner and operator education and permitting methods. [Environment]**

A total of 513 inspections at wastewater works across the province were completed by Saskatchewan Ministry of Environment staff during the 2007-08 reporting period. Information gained from the comprehensive inspection results is useful in protecting source water, aquatic habitat and will also continue to be used to advance wastewater management in the province. Information gained during wastewater works inspections will also be used to inform and help direct implementation of the Canada-

wide Strategy for Municipal Waste Water Effluent (MWWWE) in the future. A total of 124 additional wastewater works operational permits were issued, renewed or amended in 2007-08.

**Planned Activity Develop and implement an annual municipal wastewater reporting protocol. [Environment]**

An annual Municipal Wastewater Reporting Protocol was not completed as planned during 2007-08. However, significant progress to supporting materials and information necessary for the development of the protocol was completed including revisions to the wastewater monitoring requirements and database updates to sewage works specific permit requirements. Delays were encountered as a re-evaluation of wastewater sites in the province for compliance with possible future Canada-wide Standards for MWWWE was undertaken. Saskatchewan Ministry of Environment staff review the results of wastewater monitoring at least on an annual basis.

**Planned Activity: Development of the Saskatchewan Ministry of Environment’s Environmental Management System to support wastewater management, compliance activities and handle the ever increasing demand for data and information. [Environment]**

Wastewater sample analysis is being transferred regularly from laboratories into EMS. Environmental Project Officers are now able to create reports on the different wastewater facilities across the province. The Ministry plans to supply wastewater information to the public through SaskH2O.ca, however, resources issues has delayed the launch of this addition to the website.

Other activities important to identifying and minimizing the risks to source water quality developed and delivered during 2007-08 included the following:

Saskatchewan Ministry of Agriculture requires intensive livestock operations to develop waste storage and management plans that will not contaminate water resources. In 2007-08, there were 14 approvals issued for intensive livestock operations. Some of the approvals were for expansions and/or modifications to existing operations. Surface water quality monitoring of watercourses adjacent to intensive livestock operations is continuing. The 2003 Surface Water Quality Monitoring Report is available on the Internet: (<http://www.agriculture.gov.sk.ca/Default.aspx?DN=ab517097-0749-4293-b98e-dbe1935deefa>).

Under *The Pest Control Products (Saskatchewan) Act*, there were 2,437 pesticide applicator licenses issued along with 400 pesticide vendor licenses. Each vendor maintains an approved storage facility supported by the industry and Saskatchewan Ministry of Environment. An applicant for a pesticide applicator license must pass a pesticide applicator course. The applicator training is valid for a five year period; however, the applicator license is renewed on an annual basis.

**Measurement Results**

*Number of sewage effluent discharges that represent a risk to source waters*

**Table 14: Number of sewage effluent discharges that represent a risk to source waters**

March 2004	March 2005	March 2006	March 2007	March 2008	Annual Change
93	93	85	116*	114	↓ 2**

\*The ministry has initiated preventative and compliance actions to resolve problems or advance progress at 18 sewage works in the province since 2004-05.

\*\* Performance measure evaluates likely compliance with pending Canada-wide Standards for Municipal Wastewater Effluents as of 2007-08.

Source: Ministry of Environment – Environmental Management System

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As of March 31, 2008, approximately 114 wastewater systems have been identified as having discharge that may reach a surface water body under certain conditions. Of these 114 systems approximately 70 may require compliance with pending Canada-wide Standards for MWW (Table 14). The Saskatchewan Ministry of Environment has increased preventative and compliance actions to resolve problems or advance progress at 43 sewage works in the province during 2007-08, bringing the total to approximately 61 since 2004-05. On an annual basis, ministry staff review the quality of effluent from each regulated sewage works. Reduction of ammonia and chlorine residual emissions within treated wastewater effluent, sewage works capacity or other treatment capability issues typically involve significant planning, investment and construction. Therefore, it can be expected that reductions in the number of works, which represent a risk to source waters, will be a time consuming process.

The number of sewage effluent discharges that represent a risk to source waters is a direct indication of the potential for source water contamination due to poor wastewater treatment. This measure now incorporates the need for future possible compliance with MWW standards. This measure was selected since it is the most direct measure of the number of potential significant contamination point sources. Further work to resolve problematic wastewater systems is planned for 2008-09 and beyond.

### **Watersheds are protected, natural purification and protection processes are maximized and potential for contamination is minimized**

Protection of source waters can reduce the costs of water treatment and improve water quality while helping to maintain other water uses. Sound water resource management means that the processes, which break down wastes, must be protected as must land use practices that can protect water quality from contamination. Actions in terms of both organizational structure and watershed/water management are improving source water protection in the province. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that watersheds are protected, natural purification and protection processes are maximized and potential for contamination is minimized.

#### **Commitments, Activities and Achievements**

##### **Planned Activity: Continue to lead the development of a Canada-wide Strategy for the Management of Municipal Wastewater Effluent (MWW). [Environment]**

The Saskatchewan Ministry of Environment continued as “champion” and “chair” of the Canadian Council of Ministers of the Environment (CCME) – Development Committee charged with development of a Canada-Wide Strategy for MWW. During the reporting period, the national Canada-Wide Strategy for MWW reached the final draft stage. A fourth round of national consultation was undertaken including consultations in Regina and Saskatoon in January 2008. Harmonized requirements for improved management of wastewater effluents, particularly with respect to ammonia and residual chlorine based disinfectants are the intended outcomes. It is anticipated the Canada-wide Strategy for MWW will be endorsed nation-wide through the CCME by fall 2008. Work on a related biosolids management plan began late in the fiscal year (see [http://www.ccme.ca/ourwork/water.html?category\\_id=81](http://www.ccme.ca/ourwork/water.html?category_id=81)).

##### **Planned Activity: Work with municipalities with water sources identified as Groundwater Under Direct Influence of surface water to develop source water protection plans. [Environment]**

During the 2007-08 fiscal year, Saskatchewan Ministry of Environment staff met with the owners of waterworks with source supplies identified as potentially Groundwater Under Direct Influence (GUDI) of surface water to help them understand the significance of GUDI on their water safety and treatment system effectiveness. Several communities are now advancing formal assessment of their waterworks for GUDI status and some owners of waterworks systems have declared or determined the systems to

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be under direct influence of surface water. Source water protection plans are being developed and implemented in some Saskatchewan communities (i.e. Avonlea) as a means to protect drinking water safety. Further activities to aid municipalities with GUDI based water supplies to develop source water protection plan will continue in the future.

**Planned Activity: Facilitate the work of local planning committees to complete source water protection plans for the North Saskatchewan, South Saskatchewan and Upper Qu'Appelle River watersheds and co-ordinate the development of the provincial responses to these plans. Initiate new plans in selected watersheds. [Saskatchewan Watershed Authority]**

Local leadership in implementing source water protection plans has been facilitated by providing technical and financial support to four non-profit organizations. A total of \$190,000 has been committed to these groups to implement five source water protection plans.

The Spirit Creek Watershed Monitoring Committee (SCWMC) continues to monitor water quality in the Spirit Creek. A Five-year Report on the work completed by the committee in 2006 and is available at <http://www.spiritcreek.ca> on the SCWMC website. The SCWMC was established in 2000 by the Minister of Saskatchewan Ministry of Agriculture to provide independent monitoring of water resources in the Spirit Creek Watershed Basin.

Agriculture initiated research to investigate the impacts of agriculture on surface water quality in 2006. This work is focused on assessing long-term trends in water quality in Saskatchewan's rivers and utilizing other database information (i.e. Agriculture Census Data) to further develop our understanding of the landscapes and agricultural activities that influence surface water quality. It is anticipated this knowledge will facilitate more effective land management decisions and lead to improved program delivery.

**Planned Activity: Assist designated watershed groups with the implementation of watershed plans and annually report progress. [Saskatchewan Watershed Authority]**

The Authority continues to actively support watershed and aquifer source water protection planning. Members of the locally-based watershed and aquifer advisory committees, with the support of technical committees, contribute their perspectives and expertise, distribute information to the groups they represent and ultimately develop the plans and implement the key actions contained in the source water protection plans. Work towards the development of plans for the Swift Current Creek and Carrot River watersheds is underway. The technical committees have been established in these areas and the watershed advisory committees for the two watersheds will soon be operational.

**Planned Activity: Continue co-operative development of an Integrated Water Management Framework. [All agencies participating in the Safe Drinking Water Strategy]**

A committee of federal and provincial agencies with direct involvement in water issues is developing the draft vision, goals and objectives of an Integrated Water Management Framework and the draft Terms of Reference for the governance process and structure intended to operationalize the Framework. The Authority co-chairs the committee and provides secretariat support to the committee. Work is progressing with finalization anticipated in 2008.

Development of an allocation policy will continue to be a priority for the Saskatchewan Watershed Authority in 2008-2009. Legislative amendments have been postponed in the expectation that the corporate business analysis initiated in February 2008 will have implications for our legislation.

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**Planned Activity: Implement revisions to *The Planning and Development Act, 1983* to include municipal water source protection. [Municipal Affairs]**

Major public consultations on the new *Planning and Development Act, 2007* were completed in 2006 and the Act came into effect on March 21, 2007. The significant aspect of the new legislation is the provision for statements of provincial interest in land use and direction on municipal land use bylaws to protect water sources. The statements of provincial interest are under development, with public consultations planned in 2008.

**Planned Activity: Continue to work with municipalities and the Saskatchewan Watershed Authority to develop and implement municipal water source protection by-laws on a watershed basis that are co-ordinated with staged implementation of watershed plans. This will help to ensure that the municipalities have by-laws in place that meet the standards required to protect the watersheds. [Municipal Affairs]**

Saskatchewan Ministry of Municipal Affairs worked directly with the Saskatchewan Watershed Authority and the technical advisory committees on the development of a number of watershed plans and participated in a workshop in conjunction with the Association of Professional Community Planners of Saskatchewan to provide information to municipalities on how to implement water source protection within municipal planning bylaws.

**Other Notable and Activities and Accomplishments**

SaskWater's new zero discharge wastewater treatment system officially opened in August 2007 in Fort Qu'Appelle. The old Fort Qu'Appelle Wastewater System discharged effluent into the Qu'Appelle Lakes system. The new wastewater system pumps the wastewater out of the valley where the effluent disposes through evaporation. The system has an aerated holding pond serving as the central collection point for the town's wastewater and a transfer pump station to pump the wastewater out of the valley to a new lagoon. The lagoon provides an effective treatment area, sustainable storage capacity and requires limited operation and maintenance.

Saskatchewan Ministry of Agriculture continues to work with the Saskatchewan Watershed Authority on several riparian enhancement and/or protection projects and in the publication of "beneficial" management practices to keep riparian areas healthy and functional. The two agencies are active partners in the pilot Agro-Equivalent Environmental Farm Plan situated in the Lower Souris River Watershed. This group plan was the first of its kind in Canada and focuses on source water protection. Nine other watershed based group plans were developed and are now up and operating. These are: Swift Current Creek, Gull Lake, Wood River, Moose Jaw Creek, Buffalo Pound, Lower Assiniboine Lake of the Prairie, Lanigan Manitou, Redberry Lake and South East Upper Souris River.

Saskatchewan Ministry of Agriculture continues to provide funding through the Agriculture Development Fund for research and development of agricultural technologies for improved management and/or reduced environmental risks of pesticides, fertilizers and livestock manure.

Saskatchewan Ministry of Agriculture is in the process of implementing "environmental farm planning" as part of the Federal/Provincial Agriculture Policy Framework. Environmental Farm Plans (EFP) will help farmers to identify environmental risks, including risks to water resources. The framework provides partial funding for the implementation of practices that reduce or minimize some of the risks identified. From the start of the program in early 2005 to April 14, 2008, the Provincial Council of Agriculture Development and Diversification (ADD) Boards (PCAB – delivery agency for Environmental Farm Plans in Saskatchewan) had delivered 2,068 workshops to producers in the province with over 23,665 farm units attending and has issued 10,051 endorsements for completed farm plans. As of March 31, 2008, farmers have made

application for funding of 7,523 projects under the Canada Saskatchewan Farm Stewardship Program to implement beneficial management practices on their farms.

Saskatchewan Ministry of Agriculture administers *The Irrigation Act, 1996*. The legislation ensures soils and water are suitable for sustainable irrigation. Irrigation soils, water quality and water tables are monitored for sustainability. Technical assistance is provided when requested to Saskatchewan Ministry of Environment on effluent disposal via land application to help ensure a high level of environmental protection and ongoing agricultural productivity.

## Measurement of Results

*Water Quality Index (WQI) ratings for lakes*

**Table 15: Water Quality Index (WQI) ratings for lakes**

Waterbody	Water Quality Index Rating 2005*	Water Quality Index Rating 2006*	Water Quality Index Rating 2007
Jackfish Lake	64.3 Fair	68.7 Fair	65.4 Fair
Murray Lake	86.8 Good	91.5 Good	90.1 Good
Good Spirit Lake	88.5 Good	91.9 Good	**
Anglin Lake	100.0 Excellent	91.7 Good	92.2 Good
Christopher Lake	88.2 Good	83.8 Good	86.5 Good
Emma Lake	100.0 Excellent***	94.1 Good***	87.1 Good
Lac Pelletier	85.1 Good	87.3 Good	85.6 Good
Last Mountain Lake	78.2 Fair***	74.6 Fair***	72.9 Fair
Moosomin Reservoir	77.0 Fair	83.5 Good	82.5 good
Round Lake (Kelvington)	92.5 Good	96.2 Excellent	87.0 Good
Turtle Lake	92.5 Good	100.0 Excellent	95.4 Excellent
Brightsand Lake	83.0 Good	82.8 Good	**
Big Shell Lake	96.1 Excellent***	100.0 Excellent***	92.8 Good
Pike Lake	85.1 Good	91.6 Good	**

\* Modifications for these performance measures were required during 2006-07 to allow for greater accuracy and improved clarity. The objectives of the Water Quality Index were updated to be consistent with Saskatchewan's Surface Water Quality Objectives, which were changed in 2006. As a result of the above changes, the baseline data for the Water Quality Index rating for rivers have effectively been re-calculated and re-established to 2005 and 2006, respectively.

\*\* Site not sampled or insufficient number of samples to calculate the Water Quality Index.

\*\*\* Value recalculated in 2007-08 based on a combination of data from various sampling sites.

Source: Saskatchewan Watershed Authority water quality monitoring results

Water Quality Index ratings for rivers

**Table 16: Water Quality Index ratings for rivers (Three year average Water Quality Index Values and Ratings for Rivers)**

	2003 - 2005	Rating	2004 - 2006	Rating	2005 - 2007	Rating
Assiniboine River*	67.6	Fair	68.9	Fair	70.8	Fair
Battle River *	59.1	Marginal	64	Fair	61.3	Fair
Beaver River *	75.2	Fair	78.9	Fair	79.4	Fair
Beaver River (Beauval)	91.7	Good	91.0	Good	88.5**	Good
Beaver River – (Dorintosh)	83.4	Good	82.5	Good	88.1**	Good
Carrot River *	62.6	Fair	64.7	Fair	62.5	Fair
Churchill River *	92	Good	91	Good	91.5	Good
Churchill River (Otter Rapids)	100	Excellent	100	Excellent	100**	Excellent
Cold River (Lake Outlet)	100	Excellent	100	Excellent	100	Excellent
North Saskatchewan River *	69.4	Fair	62.7	Fair	61.8	Fair
North Saskatchewan River (Cecil Ferry downstream)	66.9	Fair	58.9	Marginal	59.0	Marginal
North Saskatchewan River (Cecil Ferry upstream)	80.9***	Good	68.1***	Fair	62.6***	Fair
North Saskatchewan River (Prince Albert)	61.5	Fair	73.3	Fair	70.5	Fair
Qu'Appelle River *	64.9	Fair	60.7	Fair	61.4	Fair
Qu'Appelle River (below Qu'Appelle Dam)	100.0	Excellent	100.0	Excellent	100.0	Excellent
Qu'Appelle River (Wascana River)	76.1	Fair	70.1	Fair	71.0	Fair
Qu'Appelle River (Hwy#11 at Lumsden)	69.0	Fair	67.4	Fair	68.7**	Fair
Qu'Appelle River (Edenwold)	61.3	Fair	62.1	Fair	58.8**	Marginal
Red Deer River (SK/MB)*	86.6	Good	88.1	Good	81.1	Good
South Saskatchewan River*	78.7	Fair	79.5	Fair	76.8	Fair
South Saskatchewan River (Leader)	-----		-----		89.9***	Good
South Saskatchewan River (near Outlook)	-----		-----		97.3***	Excellent
South Saskatchewan River (W Clarkboro)	-----		-----		97.9***	Excellent
Saskatchewan River*	74.4	Fair	73.4	Fair	74.4	Fair

\* PPWB Station

\*\* no data for 2007

\*\*\* no data for 2005

----- no sampling occurred/insufficient data

Source: Saskatchewan Watershed Authority and Saskatchewan Ministry of Environment water quality monitoring results

The Water Quality Index (WQI) is a good overall measure of the quality of water for specific uses such as the protection of aquatic life, livestock watering, recreation, etc that may not otherwise be apparent through individual water quality test results. The levels of chemicals and organisms in the samples are compared

with the WQI levels for safety and health of the people. The Index is a composite measure of different chemicals and organisms in the water and whether the water quality is safe for particular uses. It is a good measure of the quality of surface or groundwater. The WQI incorporates three elements:

- scope - the number of variables that don't meet the water quality objectives;
- frequency - the number of times that variables do not meet the objectives; and
- amplitude - the amount by which the objectives are not being met.

The Water Quality Index ratings provide a good measure of the quality of water in Saskatchewan's lakes and rivers and allow a comparison of changing results over time. However a limited number of samples are taken in any single year and this, as well as changes in water levels and river flow from year to year, can produce significant annual changes in the index. To provide a more meaningful picture of longer term change that is still sensitive to real underlying changes, the water quality index for rivers has been presented as a three year mean. It was previously presented as five and 15 year means.

From these elements, the Water Quality Index produces a score between 0 and 100. The revised Saskatchewan WQI was first applied to sites across four major waterbodies by the end of the 2003-04 fiscal year (South Saskatchewan, North Saskatchewan, Qu'Appelle and Moose Jaw rivers). Government has limited direct control over the results of this broad measure of water quality. While government regulates point source pollution, many human and natural factors can influence water quality. Water quality from surface water sources tends to change over seasons and may change over successive years as a result of pollution or other water management practices.

The following descriptive categories are used to further explain the Water Quality Index results:

- Excellent: (WQI value 95-100) - water quality is protected with a virtual absence of threat or impairment; conditions very close to natural or pristine levels. These index values can only be obtained if all measurements are within objectives virtually all of the time.
- Good: (WQI value 80-94) - water quality is protected with only a minor degree of threat or impairment; conditions rarely depart from natural or desirable levels.
- Fair: (WQI value 60-79) - water quality is usually protected but occasionally threatened or impaired; conditions sometimes depart from natural or desirable levels.
- Marginal: (WQI value 45-59) - water quality is frequently threatened or impaired; conditions often depart from natural or desirable levels.
- Poor: (WQI value 0-44) - water quality is almost always threatened or impaired; conditions usually depart from natural or desirable levels.

*Number and percentage of municipalities with bylaws in place to protect their drinking water supplies*

Baseline - December 2005		December 2006		December 2007	
Number of Municipalities	Per cent of Municipalities	Number of Municipalities	Per cent of Municipalities	Number of Municipalities	Per cent of Municipalities
178	22	178	22	181	23

Source: Saskatchewan Ministry of Municipal Affairs file records

The number of municipalities with bylaws in place to protect their drinking water supplies is a direct indication of the level of municipal protection of water sources.

In 2007, three municipal planning bylaws with drinking water protection provisions were prepared. The per cent of the urban and rural municipalities that have some form of water management policy contained in their community planning bylaws has increased to 23 per cent (13 per cent with mandatory provisions and 10 per cent with permissive or discretionary provisions). There should be more municipalities establishing bylaws with water source protection provisions in the near future, as a result of implementing the new

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*Planning and Development Act, 2007*, establishing statements of provincial interest in land use that include municipal water source protection, the increased need for planning for growth in Saskatchewan and the work of the Municipal Capacity Development Program. (Source: Saskatchewan Ministry of Municipal Affairs manual filing system on municipal bylaws)

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**Key Area: Citizens and consumers trust and value their drinking water and the operations which produce it**

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**Consumers value quality water and are willing to pay for it**

Saskatchewan residents are not always aware of the cost of providing safe drinking water. Protection of source waters, the ability to treat source water and ensure sustainable supplies is dependant on consumers that recognize the value of water and are willing to pay for it at present and in the future. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure that consumers value quality water and recognize the need to pay for it.

**Commitments, Activities and Achievements**

**Planned Activity: Increased awareness of water and aquatic ecosystems by delivering high quality water related educational material, especially Project WILD and Project Wet, to Saskatchewan teachers. [Saskatchewan Watershed Authority]**

Saskatchewan is the only jurisdiction in Canada offering the Project WILD and Project WET family of programs to all Aboriginal Teacher Education programs. During 2007-08 academic year, the new Prince Albert campus of the First Nations University of Canada and the North Battleford campus of the Indian Teacher Education Program were included in the northern areas receiving extension workshop delivery.

Significant results were achieved in the Authority's efforts to mentor newly trained Aboriginal teacher facilitators: five were involved in the co-planning and facilitation of workshops to their peers in northern Saskatchewan. For the first time, two aboriginal facilitators participated in advanced leadership training, completing the western Canada pilot for the "Adopt-a-River" program at the annual WILD Education Professional Development Conference in Lethbridge, Alberta.

**Planned Activity: Provide public education material that focuses on the cost and value of water, benefits of better management of water demand and reducing water consumption. [Environment]**

The Saskatchewan Ministry of Environment continues to advance educational efforts on water cost and value directly through distribution of brochures and at water related workshops and presentations including forums such as the SUMA annual convention. During 2007-08, nine new documents on water or wastewater related were prepared and another 46 publications were updated. Work was underway on another 15 guidelines or protocols as of March 31, 2008. These documents are either distributed directly during waterworks inspections or are provided by electronic means (at <http://www.saskh20.ca/DWBinder.asp>). The SaskH2O website also continues to remain up-to-date and is offered as an important educational and information source for the public.

The Saskatchewan Ministry of Environment participated in the Saskatchewan Water and Wastewater Association annual convention in November 2007 including the trade show as a means to further understanding of the importance of operator certification. Ministry staff continue to support education efforts at the Saskatchewan Rural Water Pipelines Association annual meeting and trade show in 2007

by means of a presentation to delegates and provision of information and documents. The ministry also assisted with the planning and delivery of a northern water workshop in April 2007.

### Measurement of Results

*Per cent of survey respondents indicating that they are willing to pay more for their drinking water*

**Table 17: Per cent of survey respondents indicating that they are willing to pay more for their drinking water**

December 2001	May 2003	March 2005	March 2006	May 2007	February 2008	Change
61	61.9	68	70.8	67.8	68.8	↑1.0

Source: Government of Saskatchewan Omnibus Polling Results – February 2008

Based on a February 2008 omnibus poll conducted by the Government of Saskatchewan, 68.8 per cent of people polled are willing to pay more to improve their drinking water (strongly agree or agree) (Table 17). This value is one per cent more than the previous poll in May 2007 and is 7.8 per cent greater than the December 2001 poll before implementation of the Safe Drinking Water Strategy. The polling results continue to show ongoing public recognition of the value of water or willingness to pay for it at levels relatively consistent with polling results since March 2005. The polling results may be related to the high level of confidence in safety of drinking water and may also be influenced by ready access to information on drinking water quality. How consumers value quality water and their willingness to pay for it is an indication of their understanding of the importance of safe drinking water and the true cost to produce it.

### Citizens and consumers trust the quality and reliability of their drinking water systems and are confident in the regulatory system

Consumer trust in drinking water and regulatory systems that govern them is vital to ensuring the long-term sustainability of waterworks. Consumers who trust the quality and reliability of their water supplies are more willing to support the production of safe drinking water in the future. Release of polling results also bolsters transparency and public trust. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to improve citizen and consumer trust in the quality and reliability of their drinking water systems and confidence in the regulatory system.

#### Commitments, Activities and Achievements

**Planned Activity: Continue to implement the drinking water polling strategy and publish results, which allow for the tracking of public opinion and trust in drinking water and the associated regulatory systems. For 2007-08, polling will be expanded to examine how many residents drinking bottled water believe their community water is safe to drink. [Environment]**

The Saskatchewan Ministry of Environment has continued to implement its polling strategy to gain important insight into public opinion associated with drinking water. The strategy employs three main tools in terms of its strategy related to public polling on water related issues. Its primary tool is the omnibus polling conducted by the Government of Saskatchewan to ask questions it believes important to performing its duties regarding drinking water. When possible, the polling results produced by

GlobeScan Inc. (formerly Environics) polling company, which does quarterly polling of Canadian attitudes towards environmental and natural resources issues, are used to track the ministry's performance in relation to other provinces. The ministry also, from time to time, conducts its own polling in Saskatchewan related to the overall performance of the ministry in relation to its mandate. Polling on drinking water related issues will continue in 2008-09. The most recent February 2008 omnibus polling results, which follow below, show the measurement of results. As a result of changing priorities within the ministry, polling was not expanded to examine how many residents drinking bottled water believe their community water is safe to drink.

**Planned Activity: Develop and deliver public messaging about the safety and quality of drinking water from water facilities that are meeting/exceeding drinking water regulatory requirements. [SaskWater and Environment]**

During 2007-08, the Saskatchewan Ministry of Environment revised the SaskH2O website to provide a simpler and more effective means of conveying site specific drinking water quality information for consumers seeking information on their water quality. The revised community or site specific water quality information, including separate reports on current and historical water quality, can be viewed at <http://www.saskh2o.ca/MyDrinkingWater.asp> by selecting a specific waterworks under "view water sample test results". The Ministry also continued to deliver messages on water safety and quality during workshops and conferences during the fiscal year. Correspondence was developed and sent to waterworks owners to remind them of the approaching compliance deadline for existing waterworks with known exceedences above maximum acceptable limits for chemical-health water quality parameters such as arsenic, uranium, nitrate, etc. A Drinking Water Quality Index was also developed during 2007-08 to aid consumer understanding of water quality.

**Planned Activity: Establish awards recognizing communities providing exceptional water quality or water provision services. [Environment]**

No awards were established in 2007-08. The Saskatchewan Ministry of Environment intends to employ the Drinking Water Quality Index in determining which communities will receive awards recognizing exceptional water quality and water provision services in future years.

**Measurement Results**

*Per cent of survey respondents indicating that they are very or somewhat confident in the quality of their tap water*

**Table 18: Per cent of survey respondents indicating that they are very or somewhat confident in the quality of their tap water**

<b>December 2001</b>	<b>May 2003</b>	<b>March 2005</b>	<b>March 2006</b>	<b>May 2007</b>	<b>February 2008</b>	<b>Change</b>
72	87	86	87.3	82.6	86.6	↑ 4.0

Source: Government of Saskatchewan Polling Results – February 2008

Based on a February 2008 omnibus poll conducted by the Government of Saskatchewan, 86.6 per cent of people polled strongly agreed or agreed they are confident in the safety of their own drinking water (Table 18). These polling results show a high level of confidence represent an increase of 4.0 per cent from May 2007 and are 14.6 per cent greater than December 2001 when 72 per cent of people surveyed were very or somewhat confident in the quality of their tap water. Actions initiated under the Strategy such as consumer education efforts, waterworks inspections, implementation of water quality standards, water workshops and

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consumer notification help build confidence in the safety of drinking water at a relatively high level in excess of 80 per cent. Ongoing attention to the elements of the strategy will help to maintain the high level of public confidence in safety of drinking water in the future. The measure is important since it provides an indication of how efforts to ensure safe drinking water are progressing.

## **Citizens have meaningful access to information about the quality of their water**

Information on water quality is important in building public trust in water systems. Information must be understandable, current and readily accessible. To build full trust, information needs to be available both from the waterworks owner and the regulator. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to ensure citizens have meaningful access to information about the quality of their drinking water.

### **Commitments, Activities and Achievements**

**Planned Activity: As of September 1, 2006, and annually thereafter, municipalities are required to provide to the public key information on the financial sustainability of their waterworks, including the extent that revenues cover expenditures and debt payments. This information will help ratepayers understand the need for cost recovery rates. Cost recovery waterworks rates are more likely to be able to provide safe drinking water. [Municipal Affairs]**

By April 21, 2008, 40 per cent of the municipalities submitted a copy to the Saskatchewan Ministry of Municipal Affairs of their public information on the financial sustainability of their waterworks. This was the second year the regulations were in effect. The ministry is currently assessing the policies and procedures for waterworks financial reporting, including how to improve public reporting.

**Planned Activity: Use polling to track changes in public attitudes towards source water protection. [Saskatchewan Watershed Authority]**

This action was not conducted for 2007/08 and was removed from the Saskatchewan Watershed Authority's Performance Plan.

**Planned Activity: Extend implementation of a Drinking Water Quality Index (DWQI) to more water users to convey easy to understand information to consumers on water quality and the adequacy of the systems that produce drinking water. Post DWQI information on the SaskH2O website. [Environment]**

The Saskatchewan Ministry of Environment has revised its system of ranking the chemical, aesthetic and operational quality of water of drinking water supplies in the province. The Saskatchewan DWQI examines water works inspection results and several water quality parameters with the exception of turbidity, in developing an easy to understand numerical and narrative statement on the relative quality of consumptive drinking water supplies in the province. Hygienic waterworks are not rated by the Drinking Water Quality Index as these systems are not for consumptive purposes. Further information on site specific Drinking Water Quality Index ratings are available at [http://www.saskh2o.ca/WaterInformationFactSheet\\_annualreport.asp](http://www.saskh2o.ca/WaterInformationFactSheet_annualreport.asp).

### **Other Notable Activities and Accomplishments**

SaskWater published its third comprehensive water quality report with its 2007 Annual report (<http://www.saskwater.com/MediaCentre/Publications.asp?sub=subPublications&type=Pub2008>).

In the comprehensive water quality report, SaskWater reports on provincial water quality parameters for all of its systems that produce potable water.

## Measurement Results

*Number of system owners that publicly release water quality results*

**Table 19: Number of system owners that publicly release water quality results**

March 2002	March 2003	March 2004	March 2005	March 2006	March 2007	March 2008	Annual Change
3	118	359	508	494	511	637	↑126

Source: Saskatchewan Ministry of Environment – Environmental Management System

As of March 31, 2008, 637 of waterworks owners publicly released water quality results to the consumers that they serve (Table 19). This value represents a significant increase since the 2006-07 fiscal year. Notification of consumers is required on an annual basis for waterworks governed by the Saskatchewan Ministry of Environment. The Ministry will continue to pursue further progress on attainment of public reporting requirements during 2008-09 and beyond. The number of system owners that publicly release water quality results is a good way to determine if consumers have direct meaningful access to information about the quality of their water. Additional waterworks specific information on drinking water quality is also available from <http://www.saskh2o.ca/MyDrinkingWater.asp>.

## Reduced consumption of water

Reduced consumption of water is important in minimizing costs and thereby properly valuing water. Water conservation is also necessary to protect water source quality and abundance, particularly in time of increased demand. The following is a summary of activities which were conducted during 2007-08 and the related achievements in working to reduce consumption of water.

### Commitments, Activities and Achievements

#### **Planned Activity: Lead implementation of the Water Conservation Plan. [Saskatchewan Watershed Authority]**

The Authority created or continued several partnerships to lead implementation of Saskatchewan's Water Conservation Plan. SaskEnergy continues to administer the EnerGuide toilet replacement program with funding from the Authority. Also, the Authority partnered with and provided funds to the communities of Humboldt and Yorkton to advance their water conservation agendas. Projects included leak detection studies and education campaigns in the communities. A partnership with SaskWater has been funded to provide water conservation information and incentives to SaskWater customers.

The Authority's partnership with the Saskatchewan Environmental Society has produced a booklet on home water conservation. The booklet is in the final draft review phase and is expected to be finalized and distributed just prior to the summer of 2008. The Authority's partnership with the Ministry of Environment's Go Green Program has provided essential funding to allow these partnerships to proceed. In addition, a partnership with Saskatchewan Ministry of Health, Saskatchewan Ministry of Environment and Saskatchewan Ministry of Enterprise and Innovation has created a Water Recycling and Reuse Advisory Group to develop a process for the approval of grey water systems and other water recycling technologies.

## Other Notable Activities and Accomplishments

SaskWater is currently in the process of developing a sustainability strategy that identifies the need to implement conservation initiatives on its systems. As part of the Saskatchewan Water Conservation Plan, Saskatchewan Watershed Authority is providing SaskWater with a grant to develop and pursue water conservation messaging to its customers in 2008. Under the program, SaskWater is developing a leak detection seminar to be offered to current and potential municipal customers. The seminar will educate municipal leaders on the importance of monitoring municipal distribution for leaks to reduce water loss.

## Measurement Results

*Average per capita consumption [gallons per capita per day]*

2000-01	2001-02	2002-03	2003	2004	2005	2006	2007	Annual Change
80.3	80.7	77.4	81.2	73.2*	72.2**	74.6***	N/A	↑ 2.4

N/A: Complete dataset is not available

\*\*\* For 2006 the LCD (litres/Capita/Day) was 339 (74.57 gallons per day) and the weighted LCD was 451 (99.21 gallons).

\*\* For 2005 the LCD (litres/Capita/Day) was 328 (72.15 gallons per day) and the weighted LCD was 427 (93.92 gallons).

\* For 2004 the LCD (litres/Capita/Day) was 328 (72.15 gallons per day) and the weighted LCD was 437 (96.13 gallons).

Source: Saskatchewan Community Water Use records for 2006, published June, 2007

Measuring the municipal per capita water consumption provides for total annual urban water use (in-home, business and municipal irrigation) within communities. The annual consumption is affected by summer irrigation demands, which vary between wet and dry years causing the performance measure to vary between years. However, because the goal of water conservation is to become more efficient in all water uses, this is a good measure of water conservation in the urban setting. The Saskatchewan Watershed Authority does not have direct control over this measure, but through water conservation programs does influence the measure.

This measure is computed by summing the Litres per Capita per Day (LCD) for each community and dividing by the number of communities. The weighted LCD is computed by summing the yearly water consumption for each community and dividing by the total population and 365 days. The Saskatchewan Community Water Use Records maintained by the Saskatchewan Watershed Authority is the dataset used in this determination. The change in the water consumption rate is attributed to the natural annual variability found in water consumption records and climatic influences on water use. As the water conservation plan has only recently been implemented, it is not anticipated that a measurable decrease in water use will be measured for several more years.

A complete dataset for 2007 is not currently available. Initial data for 2007 indicates a per capita consumption of 73.69 gallons per capita per day (weighted value of 97.69 gallons per capita per day), however these values are subject to revision as additional information is received. The database source of the performance results for this measure has a time lag of about six months; January 1 to December 31, 2007 data and will be available in July 2008.

Reduction of water consumption is partly the result of promotional efforts by the Saskatchewan Watershed Authority as well as greater general emphasis through application of the drinking water awareness efforts on the true value of drinking water quality. Over the 2005 to 2008 period, brochures that focus on water use in and around the home were distributed by the Saskatchewan Ministry of Environment to help reduce water consumption by domestic water users.

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## 2007-08 Financial Overview

Actual expenditures relating to drinking water management in 2007-08 were \$55.817 million, which was \$15.587 million higher than the budgeted expenditures of \$40.230 million. This net variance is primarily attributable to payments by the Saskatchewan Watershed Authority necessitated by emergency flood relief efforts at Fishing Lake and Waldsea Lake which were somewhat offset by lower than anticipated funding provided to municipalities under the Canada Saskatchewan Infrastructure Program and Municipal Rural Infrastructure Fund due to unavailability of contractors.

Within the Saskatchewan Ministry of Environment, under expenditures were the result of vacancies, delayed staffing and secondments in comparison with a full staff compliment of 36.7 FTEs. The Saskatchewan Ministry of Health FTE utilization for the Saskatchewan Disease Control Laboratory was at the full level of 19.5 FTE's during the reporting period. In addition to the FTEs within the Saskatchewan Ministry of Health, funding is provided to Regional Health Authorities for water related programs and surveillance. It is not possible to state the actual number of Regional Health Authority FTEs that are dedicated to water as a number of different disciplines (i.e. Medical Health Officers, Public Health Inspectors and Public Health Nurses) can become involved in water and or water related disease surveillance and issue-specific time is not tracked.

Under the Canada-Saskatchewan Municipal Rural Infrastructure Fund (MRIF) and the Canada-Saskatchewan Infrastructure Program (CSIP), the Saskatchewan Ministry of Municipal Affairs provides financial support to municipalities for priority drinking water and wastewater infrastructure improvements. In 2007-08, \$14.9 million in federal and provincial funding was paid out under the MRIF and \$4.5 million in federal and provincial funding was paid out under the CSIP. A list of 2007-08 approved projects for MRIF water and sewer projects is available on the Internet ([http://www.saskh20.ca/WaterInformationFactSheet\\_annualreport.asp](http://www.saskh20.ca/WaterInformationFactSheet_annualreport.asp)).

There are no revenues that arise specifically in relation to delivery of drinking water related activities for the Ministries of Environment, Municipal Affairs and Agriculture. Any revenues that arise from government commitments and activities relating to drinking water and source water protection within the Ministry of Health, SaskWater or the Saskatchewan Watershed Authority are reported within the annual reports for each of those participating agencies.

## Expenditures

The following table outlines information on the actual and budgeted expenditures based on original 2007-08 and revised estimates relating to water management and the Safe Drinking Water Strategy. Funding for water management activities comes from various Government ministries and agencies and is contained in their respective budgets. Variance explanations have been provided for all variances that are greater than \$5,000.

Ministry or Agency	Estimates Budget (\$000s)	Actual Expenditure (\$000s)	Variance Over (Under) (\$000s)
Saskatchewan Ministry of Environment	3,196	3,047	(149) <sup>1</sup>
Saskatchewan Watershed Authority	7,184*	31,983	24,799 <sup>2</sup>
Saskatchewan Ministry of Municipal Affairs			
- CSIP**	2,376	4,526	2,150 <sup>3</sup>
- MRIF	23,663	14,928	(8,735) <sup>3</sup>
Saskatchewan Ministry of Municipal Affairs - Total	26,039	19,454	(6,585) <sup>3</sup>
Saskatchewan Ministry of Health			
Regional Health Services			
- Regional Health Authorities (Health Regions) Base Operating Funding	456***	456	0
- Regional Targeted Programs and Services	30	20	(10) <sup>4</sup>
- Regional Programs Support	20	0	(20) <sup>4</sup>
Saskatchewan Disease Control Laboratory – Environmental Services	799	857	58 <sup>5</sup>
Saskatchewan Ministry of Health - Total	1,305	1,333	28
<b>Total</b>	<b>37,724</b>	<b>55,817</b>	<b>18,093</b>

\* Expenditures shown are grants from the General Revenue Fund to the Saskatchewan Watershed Authority for these programs.

\*\* The CSIP program was transferred to the Saskatchewan Ministry of Highways and Infrastructure as per Order in Council on November 21, 2007.

\*\*\* This amount does not include additional funding provided to health regions to offset increases to salaries and benefits through collective bargaining agreements.

### Explanations of Major Variances

<sup>1</sup> Under expenditure resulted from prolonged staffing activities encountered by Saskatchewan Ministry of Environment, Drinking Water Quality Section during the fiscal year. These vacancies resulted in a net reduction in the rate of waterworks and sewage works inspections during the fiscal year for the Saskatchewan Ministry of Environment Drinking Water Quality Section staffing levels totaled 36.7 FTEs at the end of 2007-08, unchanged from the previous fiscal year.

<sup>2</sup> Over expenditure during 2007-08 by the Saskatchewan Watershed Authority are the result of payments necessitated by emergency flood relief efforts at Fishing Lake and Waldsea Lake.

<sup>3</sup> The 2007-08 budget provided an estimated \$2.376 million under CSIP and \$23.663 million under the MRIF for water and sewer projects. By the end of the year, \$4.526 million was spent on the CSIP projects and \$14.928 million was spent on the MRIF projects. Over expenditure on CSIP is due to projects scheduled for

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completion in the 2006-07 fiscal were completed in 2007-08 and were not included in the 2007-08 budget. In the case of some projects, the full amounts budgeted were not spent because many projects were delayed due to the unavailability of contractors. The amounts have been rolled over to the following year. The actual cost of some projects came in below the estimated cost and a few projects were withdrawn due to escalating costs. Responsibility for the CSIP program was transferred to the Saskatchewan Ministry of Highways and Infrastructure at the conclusion of the 2007-08 year.

<sup>4</sup> \$30,000 total under-expenditure for Regional Targeted and Regional Programs resulted from water-related initiatives such as training and manuals not being finalized in 2007-08.

<sup>5</sup> \$58,000 over-expenditure for the Saskatchewan Disease Control Laboratory is mainly due to collective bargaining agreement and laboratory technologist salary supplement increases.

## Revenues

There are no revenues that arise specifically in relation to delivery of drinking water related activities for the Saskatchewan Ministries of Environment, Municipal Affairs and Agriculture. Any revenues that arise from government commitments and activities relating to drinking water and source water protection within the Saskatchewan Ministry of Health, SaskWater or the Saskatchewan Watershed Authority are reported within the annual reports for each of those participating agencies.

### For More Information

Further detailed information on the status of drinking water in Saskatchewan is available from Saskatchewan Ministry of Environment or at the SaskH2O Website (<http://www.SaskH2O.ca/news.asp> or <http://www.SaskH2O.ca/MyDrinkingWater.asp>).

Next year's annual report will address status of drinking water for the 2008-09 fiscal year.

Further information is also available by contacting:  
Drinking Water Quality Section  
Environmental Protection Branch  
Saskatchewan Ministry of Environment  
3211 Albert Street  
REGINA, SK S4S 5W6  
Telephone: (306) 787-6504

or at Saskatchewan Ministry of Environment's inquiry center toll free in Saskatchewan at 1-800-567-4224.

Feedback on the key actions and results may also be provided to Saskatchewan Ministry of Environment through the contact information immediately above.

An electronic copy of this report is available on the Internet (<http://www.SaskH2O.ca/news.asp>).

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## Appendix A: List of Acronyms Contained in this Document

ADD	Provincial Council of Agriculture Development and Diversification Boards
CAC	Certification Advisory Committee
CCME	Canadian Council of Ministers of the Environment
CES	Consulting Engineers of Saskatchewan
CEU	Continuing Education Units
CSIP	Canada-Saskatchewan Infrastructure Program
DWQI	Drinking Water Quality Index
EBWO	Emergency Boil Water Order
EMS	Environmental Management System
EPO	Environmental Project Officer
FTE	Full Time Equivalent
GUDI	Groundwater Under Direct Influence
INAC	Indian and Northern Affairs Canada
LCD	Litres per Capita per Day
MRIF	Canada-Saskatchewan Municipal Rural Infrastructure Fund
MWWE	Canada-wide Strategy for Municipal Waste Water Effluent
NTU	Nephelometric Turbidity Units
OCB	Operator Certification Board
PCAP	Prairie Conservation Action Plan
PDWA	Precautionary Drinking Water Advisory
RHA	Regional Health Authority
SARM	Saskatchewan Association of Rural Municipalities
SCADA	Supervisory Control and Data Acquisition
SCWMC	Spirit Creek Watershed Monitoring Committee
SIASST	Saskatchewan Institute of Applied Science and Technology
SUMA	Saskatchewan Urban Municipalities Association
SWWA	Saskatchewan Water and Wastewater Association
UV	Ultraviolet
WQI	Water Quality Index





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