

# **GUELPH WATERWORKS DIVISION**

**Ontario Regulation 170/03  
Annual and Summary Report  
For the Period  
January 1 to December 31, 2009  
For Guelph Well Supply and the  
Gazer Mooney Subdivision Water Distribution System**

*Submitted to:*

*Guelph City Council  
And Township of Guelph/Eramosa*

*Prepared by: The City of Guelph Waterworks Division of the  
Environmental Services Department*

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**SECTION 1  
EXECUTIVE SUMMARY**

## **Section 1 Executive Summary**

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This report is submitted to satisfy Schedule 22 of Ontario Regulation 170/03 (O. Reg. 170/03) requirement to prepare and distribute a Summary Report. According to this regulation, the Summary Report must contain the following information:

- List the requirements of the Safe Drinking Water Act, the regulations, the system's approval, drinking water works permit (DWWP), municipal drinking water licence (MDWL), and any orders applicable to the system at any time during the period covered by the report;
- For each requirement that was not met, the duration of the failure and the measures that were taken to correct the failure;
- A summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average and maximum daily flows; and a comparison of this information to the rated capacity and flow rates approved in the system's approval, DWWP or MDWL.

As well, this report is submitted to satisfy the Section 11 of O. Reg. 170/03, requirement to prepare and distribute an Annual Report. According to this regulation, the Annual Report must contain the following information (for the 2009 reporting period):

- A brief description of the drinking water system;
- A list of water treatment chemicals used;
- A summary of the most recent water test results required under O. Reg. 170/03 or an approval, MDWL or order ;
- A summary of adverse test results and other issues reported to the Ministry including corrective actions taken;
- A description of major expenses incurred to install, repair or replace required equipment; and
- Where this report is available for inspection.

Guelph Well Supply is owned by the Corporation of the City of Guelph and is operated by the staff of the Guelph Waterworks Division of the Environmental Services Department (hereafter known as Guelph Waterworks). Guelph Well Supply delivers water to approximately 120000 people within the City of Guelph and the Gazer Mooney Subdivision Water Distribution System (hereafter known as the Gazer Mooney System). The Gazer Mooney System serves approximately 200 people, is owned by the Township of Guelph/Eramosa and is operated by Guelph Waterworks. Water is supplied to the Gazer Mooney System from Guelph Well Supply. These systems are principally regulated by the Province of Ontario and the Ministry of the Environment (MOE) via the application of the Ontario Water Resources Act and its attendant regulations as well as the Safe Drinking Water Act and its attendant regulations. Municipal water systems in Ontario are amongst the most regulated water systems in North America.

This report is prepared and submitted to meet the regulatory requirements for both Guelph Well Supply and the Gazer Mooney System.

Section 2 of this report contains a brief description of the Guelph Waterworks System and the Gazer Mooney Systems.

## ***Treatment***

In 2009, all water provided in Guelph Well Supply and the Gazer Mooney System was treated in a fashion consistent with the practices as outlined by the MOE in the “Procedure for Disinfection of Drinking Water in Ontario “ and/or in a fashion consistent with specific requirements outlined by Certificates of Approval (C of A), Municipal Drinking Water Licenses (MDWL) and Drinking Water Works Permits (DWWP) . These practices include the use of approved potable water treatment chemicals – specifically sodium hypochlorite and sodium silicate. Sodium hypochlorite was used as a disinfection chemical and sodium silicate was used as an iron sequestration chemical. Additionally, water from the Emma Well, Water St. Well, and water passing through F.M. Woods Pumping Station was also disinfected with ultraviolet light (UV) treatment as per the regulatory requirements for those stations.

In 2009, there were two brief instances in Guelph Well Supply in which ultraviolet disinfection dosages momentarily dropped below the regulatory limit. Wellington-Dufferin-Guelph Public Health (WDGPH) and the Ministry of the Environment were informed and no further action was required by the City of Guelph. During these momentary UV drops, disinfection was maintained by chlorination using sodium hypochlorite.

In 2009, for both the Gazer Mooney System and Guelph Well Supply, all contact times for disinfection by sodium hypochlorite were achieved and all system free chlorine residuals were above the regulatory minimums.

## ***Sampling***

In 2009, over 22200 microbiological, chemical and physical quality tests were performed on treated water supplied by Guelph Waterworks including water supplied to the Gazer Mooney System. All samples were collected by certified Guelph Waterworks operators following accepted industry standards and Ministry of the Environment (MOE) protocols. Analyses were performed by these same operators and by accredited independent laboratories on water samples collected throughout the water systems (supply and distribution).

In 2009, all water supplied to consumers met, or surpassed all health-related Ontario Drinking Water Standards.

Of the 8623 treated water bacteriological analyses performed on treated water, no tests or 0.0 percent of tests indicated the presence of adverse indicator bacteria. At no time was *E. coli* detected in Guelph Well Supply or the Gazer Mooney System treated drinking water.

In total, 10540 chemical and physical analyses were performed. This next section summarizes the sampling and results for Guelph Well Supply and the Gazer Mooney System:

### Sodium

- Of the sixteen sodium samples taken in the Guelph Waterworks System during 2009, fifteen samples showed reportable levels of sodium (>20mg/L) that were below the aesthetic guideline of 200 mg/L (see Table K).

### Community Lead Testing Program

- Under Schedule 15.1 of O. Reg 170/03, lead sampling was required to be completed at residential locations (private plumbing), non-residential locations (private plumbing) and locations within the public distribution system.
- This regulated program is known as the Community Lead Testing Program. Schedule 15 of the regulation specifies that a certain number of samples are required to be taken in each type of location during specified time periods throughout the year using a specific sampling protocol.
- The number of samples that are required to be collected is determined by the population that the water system serves.
- The time periods are identified as a winter period extending from December 15 until April 15 and a non-winter period extending from June 15 to October 15. The third sampling period (periods one and two were completed in 2007/2008) covers December 15, 2008 through April 15, 2009 and is known as round 3 of the program. The fourth period covers June 15, 2009 through October 15, 2009 and is known as round 4 of the program. The fifth round began December 15, 2009 and will end April 15, 2010 and is known as round 5.
- In April of 2009, Guelph Waterworks was granted partial relief from a full lead sampling regime in consideration of the acknowledgement that the City would develop and implement a Corrosion Control Plan (instead of the 100 residential and 10 non-residential locations required to be sampled during rounds 3 and 4, the reduced sampling regime called for 50 residential and 5 non-residential sampling locations).
- This next section of the report briefly summarizes both the sampling and results for the Community Lead Testing Program for both the Guelph Well Supply and the Gazer Mooney System:

#### ➤ Round 3 Sampling and Results:

- Guelph Well Supply. In the 2009 portion of round 3 of the regulated Community Lead Testing Program for Guelph Well Supply, 227 samples were taken at a total of 85 locations, 57 private plumbing locations and 28 distribution locations were sampled. Of the 171 samples taken on private plumbing, 114 samples were analyzed for lead and 89 samples showed detection values for lead. Six samples showed values above 0.01mg/L for private plumbing. Of the 56 samples taken from the public distribution system for the Community Lead Testing Program, 28 samples were analyzed for lead and 8 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 85 remaining samples were analyzed for alkalinity and/or pH.
- Gazer Mooney System. In the 2009 portion of round 3 of the regulated Community Lead Testing Program for the Guelph Waterworks System, 13 samples were taken at a total of 5 locations; three private plumbing locations and 2 distribution locations were sampled. Of the 9 samples taken on private plumbing, 6 samples were analyzed for lead and 6

samples showed detection values for lead. Zero samples showed values above 0.01mg/L for private plumbing. Of the 4 samples taken from the public distribution system for the Community Lead Testing Program, 2 samples were analyzed for lead and 1 sample showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 5 remaining samples were analyzed for alkalinity and/or pH.

➤ **Round 4 Sampling and Results:**

- **Guelph Well Supply.** In round 4 of the regulated Community Lead Testing Program for Guelph Well Supply, 237 samples were taken at a total of 90 locations, 57 private plumbing locations and 33 distribution locations were sampled. Of the 171 samples taken on private plumbing, 114 samples were analyzed for lead and 112 samples showed detection values for lead. Six samples showed values above 0.01mg/L. Of the 66 samples taken from the public distribution system for the Community Lead Testing Program, 33 samples were analyzed for lead and 9 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 90 remaining samples were analyzed for alkalinity and/or pH.
- **Gazer Mooney System.** In round 4 of the regulated Community Lead Testing Program for the Gazer Mooney System, 48 samples were taken at a total of 18 locations, 12 private plumbing locations and six distribution locations were sampled. Of the 36 samples taken on private plumbing, 24 samples were analyzed for lead and 18 samples showed detection values for lead. Zero samples showed values above 0.01mg/L for private plumbing. Of the 12 samples taken from the public distribution system for the Community Lead Testing Program, 6 samples were analyzed for lead and 5 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 18 remaining samples were analyzed for alkalinity and/or pH.

➤ **Round 5 Sampling and Results:**

- **Guelph Well Supply.** In the 2009 portion of round 5 of the regulated Community Lead Testing Program for Guelph Well Supply, 23 samples were taken at a total of 9 locations, five private plumbing locations and 4 distribution locations were sampled. Of the 15 samples taken on private plumbing, 10 samples were analyzed for lead and 10 samples showed detection values for lead. One sample showed a value above 0.01mg/L for private plumbing. Of the 8 samples taken from the public distribution system for the Community Lead testing Program, 4 samples were analyzed for lead and 3 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 9 remaining samples were analyzed for alkalinity and/or pH.
- **Gazer Mooney System.** In the 2009 portion of round 5 of the regulated Community Lead Testing Program for the Gazer Mooney System, no samples were scheduled to be taken.

All other chemical sampling met regulatory requirements for their specific chemical parameters.

In 2009, Guelph Waterworks operated and maintained all water supply and distribution systems in such a manner that water supplied to all consumers serviced by the system met the requirements of the Safe Drinking Water Act, 2002 with the exceptions listed in the executive summary and in Table I. All operation and maintenance duties were performed by certified and trained operators.

In 2009, operation and major maintenance of the water supply and distribution system was accomplished with \$11.42 million in funding from the operating budget and \$5.96 million in capital funding.

In 2009, Guelph Waterworks complied with all of the requirements of the Consolidated Certificate of Approval (CC of A), the MDWL and the DWWP, with the exceptions listed in the executive summary below and in Table I. It was also noted during the Annual MOE inspection for 2007/2008 that there were some discrepancies in descriptions of the CC of A when compared to onsite equipment. These discrepancies were corrected in 2009 with the issuance of the MDWL and the DWWP. In the 2009/2010 inspection, it was noted that two additional description amendments to the MDWL and DWWP are required and will be corrected with the next DWWP and MDWL amendments. All water supplied to customers met or exceeded regulatory water quality standards.

### **MOE Annual Inspection and Non-Compliance with Acts and Regulations - Guelph Well Supply**

In 2009, Guelph Waterworks had 8 instances of non-compliance with Ministry of the Environment regulations regarding drinking water as indicated by the Annual MOE Inspection Report. Only two of these instances were considered “adverse” results under the regulations. As a result, Guelph Well Supply received a final inspection score of 93.74%, an increase of 1.9% from 2008. No MOE orders were issued. The eight noted instances of non-compliance were of three types and included:

1. Non-compliance with a condition of a CC of A or MDWL. In two instances, UV dosing dropped below the minimum required dosage. One instance occurred at Water St. Well on May 19, 2009 and one instance occurred at F.M Woods Station on July 17, 2009. In both instances, the UV dosing was restored to regulatory levels within minutes. UV treatment failures are considered adverse events and on both occasions the MOE and Wellington-Dufferin-Guelph Public Health were notified (see Table I). No orders or directions were issued and no further action was required by City of Guelph. It should be noted that these instances represent less than 0.0006% of the running time for ultraviolet disinfection units.
2. Non-compliance with a regulation (O. Reg 170/03). In one instance, one monthly raw water turbidity sample at Queensdale Well was taken 41 days after the previous sample was taken. The maximum allowable interval between raw turbidity samples is

40 days – the MOE was informed. There was no health impact and no further action was required.

3. Non-compliance with a condition in a Permit to Take Water. In one instance, a well water level related to a Permit to Take Water (PTTW) requirement was taken 38 days after the previous water level was taken. The maximum allowable interval between water levels is 20 days. The MOE noted the interval during the 2009/2010 inspection. There was no health impact and no further action was required.
4. Non-compliance with a regulation (O. Reg 170/03). The MOE Inspector noted that at four locations, the automatic station shutdown protections were not configured in a manner outlined by the regulations. It was noted during testing that following a power interruption to the continuous chlorine analyzers, the stations would restart automatically if all other safety parameters were in their appropriate ranges. The regulation stipulates that regardless of other safety parameters, the station may not restart unless an operator has been dispatched to the site to evaluate the shutdown condition. The shutdown protections were reconfigured prior to the conclusion of the inspection to comply with the regulation.

#### **MOE Annual Inspection and Non -Compliance with Acts and Regulations – Gazer Mooney System**

In 2009, the Gazer Mooney System had no instances of non-compliance with Ministry of the Environment regulations regarding drinking water. As a result, the Gazer Mooney System received a final inspection score of 100.00%. No orders were issued.

Copies of the Ontario Regulation 170/03 Annual and Summary Report for the Period January 1 to December 31, 2009 can be obtained at the following locations:

- F.M. Woods Station, 29 Waterworks Place, Guelph, Ontario (519-837-5627);
- The main branch of the Guelph Public Library, located at: 100 Norfolk Street Guelph, Ontario ;
- Guelph City Hall, located at: 1 Carden Street, Guelph, Ontario; and,
- Electronically on the City's website, [www.guelph.ca/waterworks](http://www.guelph.ca/waterworks); and
- The Offices of the Township of Guelph Eramosa, located at: 8348 Wellington Road 124, Rockwood, Ontario.

## **SECTION 2 INTRODUCTION**

## Section 2 Introduction

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The mission of the City of Guelph Waterworks is to provide customers and the community with a safe, consistent supply of high quality drinking water while meeting, exceeding, and continually improving on legal, operational, & quality management system requirements.. Waterworks provides and promotes reliable, cost-effective systems for the safe production and delivery of consistently high quality water.

Guelph Waterworks is a municipally-owned and operated water utility first established in 1879. The source of Guelph's drinking water is a series of 19 groundwater wells and a shallow groundwater collector system. Guelph's water supply and distribution system is comprised of the following infrastructure:

- 6.36 kilometres of 900-1050 mm diameter water supply aqueduct;
- 5 underground storage reservoirs with a combined approximate capacity of 48000 cubic metres;
- 3 water towers with a combined approximate capacity of 11200 cubic metres;
- 600 kilometres of buried water main ranging in diameter from 100 mm to 900 mm;
- Approximately 3700 watermain valves;
- Approximately 2500 fire hydrants; and
- Approximately 38300 water services and water meters.

This Guelph Well Supply distribution infrastructure (including water mains, valves, fire hydrants, services, and meters) serves approximately 120000 people within the City of Guelph and approximately 200 people in the Gazer Mooney System.

The replacement cost of the entire system is estimated to be \$327 million (un-inflated 2001 figures) or approximately \$3000 per capita. The 2009 Operating Budget and Capital Budget contained expenditures totalling \$ 17.37 million. The majority of Guelph Well Supply operations and capital projects are funded directly from the sale of water, with some additional funding through government grant programs.

In 2009, a total of 17.01 million cubic metres of water was pumped and treated. Unaccounted for water (pumped from sources but not metered at an end user) totalled approximately 14 percent of all water pumped. The average daily water demand was 46607 cubic metres. The highest daily use of water occurred on June 24, during which 55337 cubic metres of water was pumped. This is 5.31 percent lower than the maximum pumpage day in 2008.

In 2009, over 22200 treated water microbiological and chemical quality tests were performed by certified operators and accredited, licensed laboratories on water samples collected throughout the water system. In all cases, the drinking water supplied to all customers was confirmed safe and the water quality was better than all Ontario and Canadian health-related guidelines.

## Regulatory Changes

In response to an outbreak of *Escherichia (E. coli):O157* in Walkerton, the Ontario Provincial Ministry of the Environment (MOE) announced Operation Clean Water and enacted the Safe Drinking Water Act (the Act) in 2002. The Act prescribes strict, mandatory requirements for testing and treatment of all municipal drinking water, and actions necessary when standards are not met. The regulation also identifies accountability for drinking water safety and supports the consumer's right to a timely and accurate reporting of water quality information.

The Act has impacted Guelph Waterworks and its customers in the following ways:

- Previously, Guelph Waterworks relied on regular bacteriological testing to determine the chlorine levels required for disinfection of our various groundwater supplies. At minimum, prescribed levels of chlorine must now be added to all water supplies and maintained in all water distributed to customers. Customers have noticed and commented on the increased chlorine taste and odour in Guelph's water. Waterworks is working with the Ministry of the Environment to safely minimize chlorine use without jeopardizing water safety and quality;
- The additional chlorine in Guelph's water is reacting with natural iron and manganese in the groundwater to create more frequent episodes of discoloured water for customers. Waterworks has increased watermain cleaning activities to limit these incidents and is planning water treatment upgrades to remove these minerals from our well supplies;
- Additional sampling and testing, and the generation of both this Summary Report and an Annual Report are required by the legislation;
- All water systems must follow minimum disinfection standards. This involves upgrades to system infrastructure including chemical systems, control and monitoring systems, and storage reservoirs;
- Schedule 22 and Section 11 of O. Reg. 170/03 require Guelph Waterworks to produce and distribute this Annual and Summary Report. Copies are available for customers in Guelph, Ontario at: F.M. Woods Station at 29 Waterworks Place, at the main branch of the Guelph Public Library at 100 Norfolk Street and also at the City Clerk's office in City Hall, at 1 Carden Street. An electronic copy of the report is available on the City's web site at [www.guelph.ca/waterworks](http://www.guelph.ca/waterworks).
- Under Schedule 15.1 of O. Reg. 170/03 which governs the provision of drinking water in both Guelph Well Supply and the Gazer Mooney System, lead sampling was required to be completed in residential locations (private plumbing), non-residential locations (private plumbing) and locations within the distribution system. This regulated program is known as the Community Lead Testing Program. The required sampling specifies that for each system, a certain number of samples be taken in each type of location in specified time periods throughout the year using a specific sampling protocol. The number of samples that are required is determined by the

population that the water system serves. The third sampling period covers December 15, 2008 through April 15, 2009 and is known as round 3. The fourth period covers June 15, 2009 through October 15, 2009 and is known as round 4. The fifth round began December 15, 2009 and will end April 15, 2010. In December of 2009, Schedule 15 of the regulation was updated with modified sampling requirements to address the transition from determination of the presence of a lead issue in a Water System to implementation of corrosion control plans.

Water rates have been increased significantly to pay for these activities and upgrades with the goal of providing a more secure water supply.

In 2009, Guelph Waterworks operated under three Consolidated Certificates of Approval, one Municipal Drinking Water License and one Drinking Waterworks Permit. For the period of January, 1, 2009 to February 12, 2009 Guelph Waterworks operated under Consolidated Certificate of Approval (CC of A) 8929-77MHN9. For the period of February 13, 2009 to June 2, Waterworks operated under the amended CC of A 5825-7APLWY. For the period of June 2, 2009 to August 27, 2009 Waterworks operated under the amended CC of A 5527-7S3P9C. For the period of August 28, 2009 to December 31, 2009 The Waterworks operated under the Municipal Drinking Water License (MDWL) 017-101 and the Drinking Water Works Permit (DWWP) 017-201. The CC's of A, the MDWL and the DWWP are required system-specific supplements to provincial regulations and act as licenses for water supply and distribution operations. These documents outline specific conditions and requirements regarding operation, maintenance and upgrades that are required by the system and are considered regulatory in nature. These documents are available by request for viewing at 29 Waterworks Place.

The Guelph Well Supply is currently licensed as a MOE Class IV Water Distribution and Supply Sub-System. In 2009, 40 water operators and staff were licensed to operate and maintain the water system.

In April 2009, Guelph Waterworks received Accreditation from the Canadian General Service Board (CGSB) which satisfied part of the requirements under the Licensing of Municipal Drinking Water Systems Regulation (O.Reg 188/07). Third party audits by the CGSB of Guelph Waterworks' Quality Management System will be undertaken in 2010

Figure A shows the locations of Guelph Well Supply facilities that were active in 2009.

Figure B shows the location of the Gazer Mooney subdivision water distribution system.

Figure A - 2009 Active Guelph Well Supply Facilities

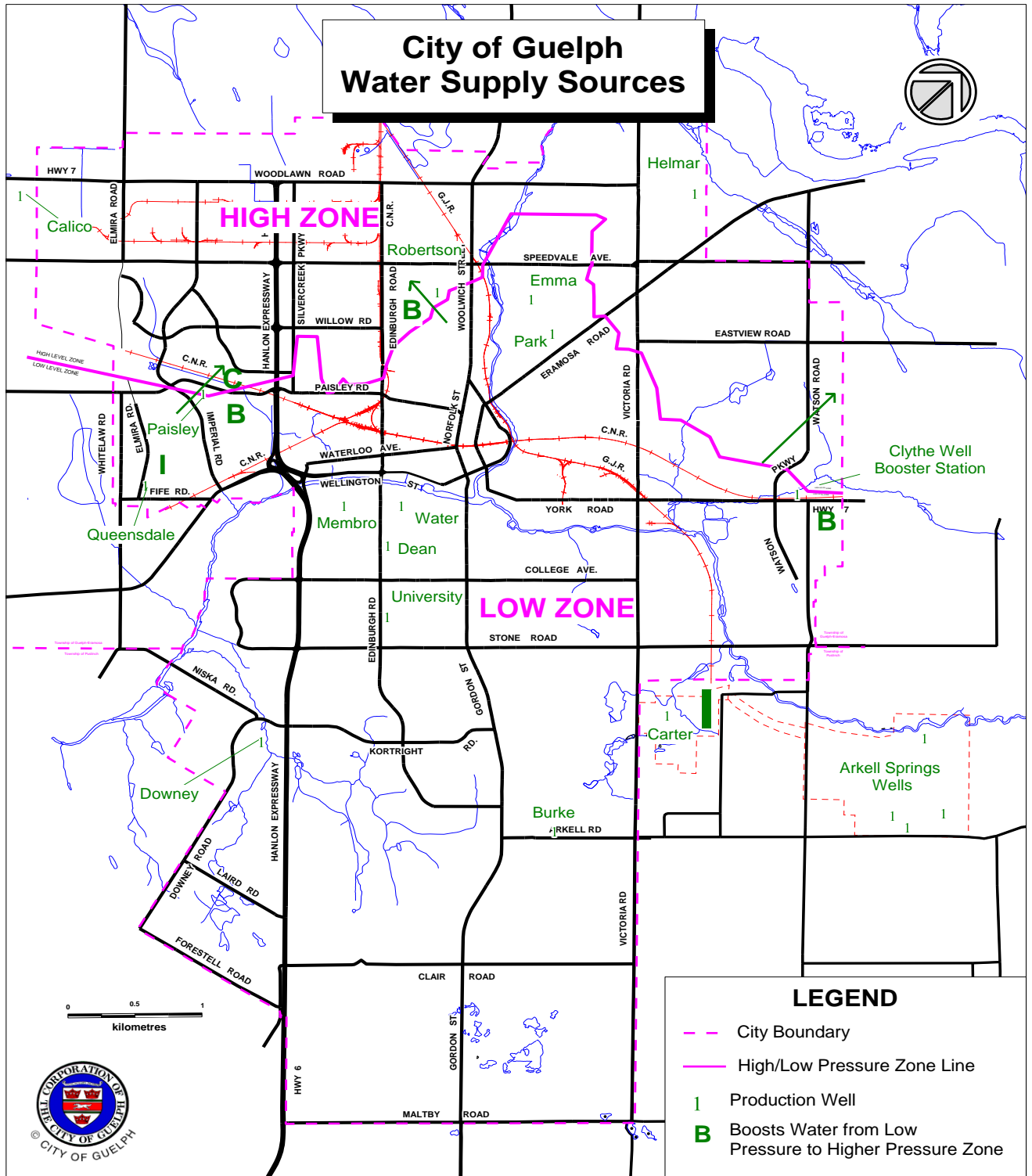


Figure B - 2009 Gazer Mooney Subdivision Water Distribution System



**SECTION 3**  
**WATER TREATMENT SUMMARY**

## Section 3 Water Treatment Summary

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This section describes the type and amount of drinking water treatment chemicals used in 2009.

In 2009, chlorine in the form of 12 percent sodium hypochlorite solution was added to disinfect all water supplied to consumers. Liquid sodium silicate was also added to all water supplied from the Helmar and Queensdale wells to control high levels of naturally occurring iron and manganese. Through the act of sequestration, sodium silicate prevents this iron and manganese from precipitating when the water is treated and thereby prevents discoloured water. All treatment chemicals are rated for use in potable water.

In 2009, there were no periods of abnormal use of sodium hypochlorite or sodium silicate.

Tables A and B below summarize sodium hypochlorite and sodium silicate use at each supply facility in 2009.

<b>Table A - 2009 Sodium Hypochlorite Usage and Chlorine Dosage</b>				
FACILITY	12 % SODIUM HYPOCHLORITE kg/Day <sup>a</sup>	WATER TREATED Cubic Metres/Day <sup>b</sup>	CHLORINE DOSE mg/L <sup>b</sup>	PURPOSE
Woods	284	19483	1.75	Well water disinfection
Helmar	31	724	5.17	Well water disinfection
Park	84	6508	1.54	Well water disinfection
Burke	72	4243	2.03	Well water disinfection
Downey	55	3950	1.67	Well water disinfection
Membro	30	2917	1.23	Well water disinfection
Queensdale	14	620	2.64	Well water disinfection
Water	9	1249	0.85	Well water disinfection
Dean	15	1270	1.38	Well water disinfection
University	20	1770	1.35	Well water disinfection
Calico	11	758	1.69	Well water disinfection
Emma	27	1744	1.89	Well water disinfection
Clythe	0	3281	0	Re-chlorination
Paisley	48	4819	1.20	Re-chlorination & well water disinfection
Robertson	13	5652	0.27	Re-chlorination

mg/L - milligrams per litre. Equivalent to parts per million.  
a - based on average water produced and average chemical dosage  
b - average values

**Table B - 2009 Sodium Silicate Usage and Dosage**

<b>FACILITY</b>	<b>SODIUM SILICATE kg/Day<sup>a</sup></b>	<b>WATER PRODUCED Cubic Metres/Day<sup>b</sup></b>	<b>SILICATE DOSE mg/L<sup>b</sup></b>	<b>PURPOSE</b>
Helmar	13	724	5.08	Iron control
Queensdale	12	620	5.57	Iron control

mg/L - milligrams per litre. Equivalent to parts per million.

a - based on average water produced and average chemical dosage

b - average values

**SECTION 4**  
**SUMMARY OF WATER TEST RESULTS**

## **Section 4 Summary of Water Test Results**

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This section summarizes water quality test results required by the Ontario Drinking-Water Systems Regulation 170/03 for the period January to December 2009.

### ***Sampling***

In 2009, over 22200 microbiological, chemical and physical quality tests were performed on treated water supplied by Guelph Waterworks including water to the Gazer Mooney System. All samples were collected by certified Waterworks operators following industry standards and Ministry of the Environment (MOE) protocols. Analyses were performed by these same operators and by accredited independent laboratories on water samples collected throughout the water systems (supply and distribution).

In 2009, all water supplied to consumers met, bettered, exceeded or surpassed all health-related Ontario Drinking Water Quality Standards.

Of the 8623 treated water bacteriological analyses performed on treated water, no tests, or 0 percent of analyses or tests indicated the presence of adverse indicator bacteria.

In total, 10540 chemical and physical analyses were performed. This next section of the report briefly summarizes both the sampling and results for both the Guelph Well Supply and the Gazer Mooney System:

### **Sodium**

- Of the sixteen sodium samples taken in the Guelph Waterworks System during 2009, fifteen samples showed reportable levels of sodium (>20mg/L) that were below the aesthetic guideline of 200 mg/L (see Table K).

### **Community Lead Testing Program**

- Under Schedule 15.1 of O. Reg 170/03, lead sampling was required to be completed at residential locations (private plumbing), non-residential locations (private plumbing) and locations within the public distribution system.
- This regulated program is known as the *Community Lead Testing Program*. Schedule 15 of the regulation specifies that a certain number of samples are required to be taken in each type of location during specified time periods throughout the year using a specific sampling protocol.
- The number of samples that are required to be collected is determined by the population that the water system serves.
- The time periods are identified as a winter period extending from December 15 until April 15 and a non-winter period extending from June 15 to October 15. The third sampling period (periods one and two were completed in 2007/2008) covers December 15, 2008 through April 15, 2009 and is known as round 3 of the program. The fourth period covers June 15, 2009 through October 15, 2009 and is known as round 4 of the program. The fifth round began December 15, 2009 and will end April 15, 2010 and is known as round 5.

- In April of 2009, Guelph Waterworks was granted partial relief from a full lead sampling regime in consideration of the acknowledgement that the City would develop and implement a Corrosion Control Plan (instead of the 100 residential and 10 non-residential locations required to be sampled during rounds 3 and 4, the reduced sampling regime called for 50 residential and 5 non-residential sampling locations).
- This next section of the report briefly summarizes both the sampling and results for the Community Lead Testing Program for both the Guelph Well Supply and the Gazer Mooney System:
  - Round 3 Sampling and Results:
    - Guelph Well Supply. In the 2009 portion of round 3 of the regulated Community Lead Testing Program for Guelph Well Supply, 227 samples were taken at a total of 85 locations, 57 private plumbing locations and 28 distribution locations were sampled. Of the 171 samples taken on private plumbing, 114 samples were analyzed for lead and 89 samples showed detection values for lead. Six samples showed values above 0.01mg/L for private plumbing. Of the 56 samples taken from the public distribution system for the Community Lead Testing Program, 28 samples were analyzed for lead and 8 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 85 remaining samples were analyzed for alkalinity and/or pH.
    - Gazer Mooney System. In the 2009 portion of round 3 of the regulated Community Lead Testing Program for the Guelph Waterworks System, 13 samples were taken at a total of 5 locations; three private plumbing locations and 2 distribution locations were sampled. Of the 9 samples taken on private plumbing, 6 samples were analyzed for lead and 6 samples showed detection values for lead. Zero samples showed values above 0.01mg/L for private plumbing. Of the 4 samples taken from the public distribution system for the Community Lead Testing Program, 2 samples were analyzed for lead and 1 sample showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 5 remaining samples were analyzed for alkalinity and/or pH.
  - Round 4 Sampling and Results:
    - Guelph Well Supply. In round 4 of the regulated Community Lead Testing Program for Guelph Well Supply, 237 samples were taken at a total of 90 locations, 57 private plumbing locations and 33 distribution locations were sampled. Of the 171 samples taken on private plumbing, 114 samples were analyzed for lead and 112 samples showed detection values for lead. Six samples showed values above 0.01mg/L. Of the 66 samples taken from the public distribution system for the Community Lead Testing Program, 33 samples were analyzed for lead and 9 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 90 remaining samples were analyzed for alkalinity and/or pH.
    - Gazer Mooney System. In round 4 of the regulated Community Lead Testing Program for the Gazer Mooney System, 48 samples were taken at a

total of 18 locations, 12 private plumbing locations and six distribution locations were sampled. Of the 36 samples taken on private plumbing, 24 samples were analyzed for lead and 18 samples showed detection values for lead. Zero samples showed values above 0.01mg/L for private plumbing. Of the 12 samples taken from the public distribution system for the Community Lead Testing Program, 6 samples were analyzed for lead and 5 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 18 remaining samples were analyzed for alkalinity and/or pH.

➤ **Round 5 Sampling and Results:**

- **Guelph Well Supply.** In the 2009 portion of round 5 of the regulated Community Lead Testing Program for Guelph Well Supply, 23 samples were taken at a total of 9 locations, five private plumbing locations and 4 distribution locations were sampled. Of the 15 samples taken on private plumbing, 10 samples were analyzed for lead and 10 samples showed detection values for lead. One sample showed a value above 0.01mg/L for private plumbing. Of the 8 samples taken from the public distribution system for the Community Lead testing Program, 4 samples were analyzed for lead and 3 samples showed detection values for lead. Zero samples showed a level of lead above 0.01mg/L in the distribution system. The 9 remaining samples were analyzed for alkalinity and/or pH.
- **Gazer Mooney System.** In the 2009 portion of round 5 of the regulated Community Lead Testing Program for the Gazer Mooney System, no samples were scheduled to be taken.

All other chemical sampling met regulatory requirements for their specific chemical parameters (see Tables C1 through H2)

In 2009, Guelph Waterworks operated and maintained all water supply and distribution systems in such a manner that water supplied to all consumers serviced by the system met the requirements of the Safe Drinking Water Act, 2002 except in the instances listed in Table I. All operation and maintenance duties were performed by certified, adequately trained operators.

The following Tables C1 through H2 provide a summary of 2009 laboratory and process parameter results. In general, Guelph Well Supply water quality test results also pertain to the water provided to the Gazer Mooney System although some specific testing is performed within the Gazer Mooney System.

A confirmed biological or chemical adverse sample result (above the regulatory standard value) requires two consecutive re-samples, where both re-sample results are consistent and demonstrate a return to compliance with legislative water quality guidelines. Adverse sample results are always re-sampled for confirmation due to the potential for false positive results inherent in any water sampling program. Guelph Well Supply and the Gazer Mooney System had no chemical or biological adverse samples in 2009.

**TABLE C1 - 2009 Guelph Well Supply  
Bacteriological Results Summary for Source Waters**

Parameter	O.D.W.S.	Total Samples	Confirmed Adverse Samples	Detects**	Range	Typical Source of Contaminant
Total Coliform count/100mL – Treated Water	0*	646	0	0	N/A	Indicates possible presence of fecal matter
E.Coli count/100mL – Treated Water	0*	646	0	0	N/A	Definite indicator of fecal matter
Heterotrophic Plate Count count/1mL Treated Water	500 <sup>B</sup>	646	N/A	18	0 - 460	Can be used as an indicator of water quality deterioration
Background Count 200 cfu/100mL Treated Water	200 <sup>B</sup>	646	N/A	2	0 - 11	Can be used as an indicator of water quality deterioration
Raw Water Bacti Tests <sup>A</sup>	N/A	3053	N/A	N/A	N/A	Can be used as an indicator of water quality deterioration

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards

N/A - Not Applicable

mL – millilitre

\* Indicator of Adverse Water Quality if presence confirmed in treated water.

\*\* Detect does not automatically equal poor water quality.

A – raw water bacteriological tests include tests for E.Coli, Total Coliform, Background Bacteria and Heterotrophic Plate Count. Raw water quality is monitored for information on source water quality only. Data for raw water is not individually reported.

B- Operational guideline only – reporting not required

.cfu – colony forming unit

**TABLE C2 - 2009 Gazer Mooney System  
Bacteriological Results Summary**

<b>Parameter</b>	<b>O.D.W.S.</b>	<b>Total Samples</b>	<b>Confirmed Adverse Samples</b>	<b>Detects**</b>	<b>Range</b>	<b>Typical Source of Contaminant</b>
Total Coliform count/100mL	0*	52	0	0	N/A	Indicates possible presence of fecal matter
E.Coli count/100mL	0*	52	0	0	N/A	Definite indicator of fecal matter
Heterotrophic Plate Count count/1mL	500 <sup>A</sup>	52	N/A	3	0 - 2	Can be used as an indicator of water quality deterioration
Background Count 200 cfu/100mL	200 <sup>A</sup>	52	N/A	0	N/A	Can be used as an indicator of water quality deterioration

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards

N/A - Not Applicable

mL – millilitre

\* Indicator of Adverse Water Quality if Confirmed in Treated Water.

\*\* Detect does not automatically equal poor water quality.

A - Operational guideline only – reporting not required.

**TABLE D - 2009 Guelph Well Supply  
Distribution Bacteriological Results Summary**

Parameter	O.D.W.S.	Total Samples	Confirmed Adverse Samples	Detects**	Range	Typical Source of Contaminant
Total Coliform count/100mL	0*	1747	0	0	N/A	Indicates possible presence of Pathogenic organisms
E.Coli count/100mL	0*	1747	0	0	N/A	Definite indicator of fecal matter
Heterotrophic Plate Count count/1mL	500 <sup>A</sup>	558	N/A	27	0 - 170	Can be used as an indicator of water quality deterioration
Background Counts 200 cfu/100mL	200 <sup>A</sup>	1747	N/A	68	0 - 230	Can be used as an indicator of water quality deterioration

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards

N/A - Not Applicable

mL – millilitre

\* Indicator of Adverse Water Quality if Confirmed in Treated Water.

\*\* Detect does not automatically equal poor water quality.

A - Operational guideline only – reporting not required.

**TABLE E1 - 2009 Guelph Well Supply & Distribution  
Process Parameter Results Summary**

Parameter	O.D.W.S.	Total Samples	Confirmed Adverse Samples	Average	Range	Health Exceedances	Notes
Manual Treated Turbidity in Supply (NTU)	1	365	N/A	0.13	0.06 – 0.29	NO	Indicator of particles in water
Raw Turbidity in Supply (NTU)	N/A	238	N/A	0.22	0.06 - 3.76	NO	Indicator of particles in water
Manual Free Chlorine in Supply (mg/L)	>0.06	4229	0	0.91	0.09 – 1.93	NO	MOE recommends 0.2 mg/L to maintain microbiological quality
Manual Free Chlorine in Distribution (mg/L)	>0.06	3706	0	0.85	0.17 – 0.98	NO	MOE recommends 0.2 mg/L to maintain microbiological quality

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards.

NTU - Nephelometric Turbidity Units.

mg/L – milligrams per litre. Equivalent to parts per million.

Note: above results are based on manual measurements. Continuous monitoring data is not captured in this report.

**Table E2 - 2009 Gazer Mooney System  
Process Parameter Results Summary**

Parameter	O.D.W.S.	Total Samples	Confirmed Adverse Samples	Average	Range	Health Exceedances	Notes
Free Chlorine in Distribution (mg/L)	0.06-4.0	365	0	0.56	0.20 - 0.98	NO	MOE recommends 0.2 mg/L to maintain microbiological quality
O.D.W.S. – Regulation 169/03 Ontario Drinking Water Standards mg/L – milligrams per litre. Equivalent to parts per million.							

<b>TABLE F - 2009 Reg. 170/03 Guelph Well Supply Schedule 23 Results</b>							
<b>Parameter</b>	<b>O.D.W.S. mg/L</b>	<b>Total Samples</b>	<b>Samples Above Detection</b>	<b>Average mg/L</b>	<b>Range mg/L</b>	<b>Health Exceedance</b>	<b>Typical Source of Contaminant</b>
Antimony	0.006	4	4	0.0010	0.0008 – 0.0012	NO	Natural Component of Water
Arsenic	0.025	4	0	N/A	N/A	NO	Natural Component of Water
Barium	1	4	4	0.059	0.057 – 0.060	NO	Natural Component of Water
Boron	5	4	4	0.063	0.057 – 0.069	NO	Natural Component of Water
Cadmium	0.005	4	0	N/A	N/A	NO	Natural Component of Water
Chromium	0.05	4	0	N/A	N/A	NO	Natural Component of Water
Mercury*	0.001	0	N/A	N/A	N/A	NO	Rare in Groundwater
Selenium	0.01	4	0	N/A	N/A	NO	Natural Component of Water
Uranium	0.1	4	4	0.0021	0.0020 – 0.0022	NO	Natural Component of Water

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards.  
N/A – not applicable  
mg/L - milligrams per litre. Equivalent to parts per million.  
< - less than  
\* Mercury sampling required once every 3 years - not required in this reporting period.

**TABLE G - 2009 Reg. 170/03 Guelph Well Supply  
Schedule 24 Results Summary**

Parameter	O.D.W.S. (mg/L)	Total Samples	Samples Above Detection	Average mg/L	Range mg/L	Health Exceedance
Alachlor	0.005	13	0	N/A	N/A	NO
Aldicarb	0.009	13	0	N/A	N/A	NO
Atrazine + N-dealkylated metabolites	0.005	13	0	N/A	N/A	NO
Bendiocarb	0.04	13	0	N/A	N/A	NO
Benzene	0.005	58	0	N/A	N/A	NO
Benzo[a]pyrene	0.00001	13	0	N/A	N/A	NO
Bromoxynil	0.005	13	0	N/A	N/A	NO
Carbaryl	0.09	13	0	N/A	N/A	NO
Carbofuran	0.09	13	0	N/A	N/A	NO
Carbon Tetrachloride	0.005	58	0	N/A	N/A	NO
Chlorpyrifos	0.09	13	0	N/A	N/A	NO
Chlorobenzene (monochlorobenzene)	0.08	58	0	N/A	N/A	NO
Cyanazine	0.01	13	0	N/A	N/A	NO
Diazinon	0.02	13	0	N/A	N/A	NO
Dicamba	0.12	13	0	N/A	N/A	NO
Diclofop-methyl	0.009	13	0	N/A	N/A	NO
1,2-Dichlorobenzene	0.02	58	0	N/A	N/A	NO
1,4-Dichlorobenzene	0.005	58	0	N/A	N/A	NO
1,2-Dichloroethane* (1,1-dichloroethane)	0.005	0	N/A	N/A		NO
1,1-Dichloroethylene (Vinylidene Chloride)	0.014	58	0	N/A	N/A	NO
Dichloromethane	0.05	58	0	N/A	N/A	NO
2,4-Dichlorophenol	0.9	13	0	N/A	N/A	NO
2,4- Dichlorophenoxyacetic acid / 2,4-D	0.1	13	0	N/A	N/A	NO
Dimethoate	0.02	13	0	N/A	N/A	NO
Dinoseb	0.01	13	0	N/A	N/A	NO
Glyphosate	0.28	13	0	N/A	N/A	NO
Malathion	0.19	13	0	N/A	N/A	NO
Metolachlor	0.05	13	0	N/A	N/A	NO

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards

N/A – not applicable

mg/L - milligrams per litre. Equivalent to parts per million.

\* 1,2-Dichloroethane only done every 3 years.

**TABLE G - 2009 Reg. 170/03 Guelph Well Supply  
Schedule 24 Results Summary (continued)**

Metribuzin	0.08	13	0	N/A	N/A	NO
Monochlorobenzene	0.08	58	0	N/A	N/A	NO
Parathion	0.05	13	0	N/A	N/A	NO
Pentachlorophenol / PCP	0.06	13	0	N/A	N/A	NO
Phorate	0.002	13	0	N/A	N/A	NO
Picloram	0.19	13	0	N/A	N/A	NO
Prometryn	0.001	13	0	N/A	N/A	NO
Simazine	0.01	13	0	N/A	N/A	NO
Terbufos	0.001	13	0	N/A	N/A	NO
Tetrachloroethylene (perchloroethylene)	0.03	58	0	N/A	N/A	NO
2,3,4,6- Tetrachlorophenol	0.1	13	0	N/A	N/A	NO
Triallate	0.23	13	0	N/A	N/A	NO
Trifluralin	0.045	13	0	N/A	N/A	NO
Trichloroethylene	0.005	58	19	0.0012	0 – 0.003	NO
2,4,6-Trichlorophenol	0.005	13	0	N/A	N/A	NO
2,4,5- Trichlorophenoxyacetic acid / 2,4,5-T	0.28	13	0	N/A	N/A	NO
Vinyl Chloride	0.002	58	0	N/A	N/A	NO

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards

N/A – not applicable

mg/L - milligrams per litre. Equivalent to parts per million.

**Table H1 - 2009 Guelph Well Supply  
Miscellaneous Water Quality Results Summary**

<b>Parameters</b>	<b>O.D.W.S. mg/L</b>	<b>Total Samples</b>	<b>Samples Above Detection</b>	<b>Average mg/L</b>	<b>Range mg/L</b>	<b>Health Exceedance</b>
Treated Water - Nitrate	10	53	70	1.018	0 - 4.9	NO
Treated Water - Nitrite	1.0	53	0	N/A	N/A	NO
Lead in Distribution System	0.01	65	19	0.0013	0 - 0.052	NO
Lead in Private Plumbing	N/A	233	206	0.0047 <sup>b</sup>	0.000 - 0.066	NO <sup>c</sup>
Trihalomethanes in Treated Supply and Distribution System	0.1	66	64	0.0354	0.0193 - 0.0483	NO
Fluoride	1.5	13	12	0.0136	0 - 0.0532	NO
Sodium	20 and 200 <sup>a</sup>	16	15	60	15 - 130	NO

O.D.W.Q.S - Regulation 169/03 Ontario Drinking Water Standards.

< - less than

mg/L - milligrams per litre. Equivalent to parts per million.

a - sodium levels above 20mg/L are reportable to the MOE every five years. Maximum allowable at any time as an aesthetic objective is 200mg/L.

b- According to WDGPH pregnant women and young children should avoid use of water containing lead above 0.01 mg/L.

**TABLE H2 - 2009 Gazer Mooney System  
Miscellaneous Water Quality Results Summary**

<b>Parameter</b>	<b>O.D.W.S. mg/L</b>	<b>Total Samples</b>	<b>Samples Above Detection</b>	<b>Average mg/L</b>	<b>Range mg/L</b>	<b>Health Exceedance</b>
Lead in Distribution System	0.01	8	6	0.00165	0 – 0.054	NO
Lead in Private Plumbing	N/A	30	24	0.0013 <sup>a</sup>	0 – 0.0019	NO <sup>B</sup>
Trihalomethanes in Distribution System	0.1	4	4	0.0316	0.0231 – 0.0401	NO

O.D.W.S - Regulation 169/03 Ontario Drinking Water Standards.

N/A – not applicable

mg/L - milligrams per litre. Equivalent to parts per million.

a – According to WDGPH pregnant women and young children should avoid use of water containing lead above 0.01 mg/L.

**SECTION 5**  
**SUMMARY OF ADVERSE TEST RESULTS**  
**AND CORRECTIVE ACTIONS**

## Section 5 Summary of Adverse Test Results and Corrective Actions

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This section summarizes adverse water quality test results and incidents, and corresponding corrective actions taken for the period January to December 2009.

Schedule 15.1 and 16 of the Drinking-Water Systems Regulation 170/03 prescribes the reporting procedures that must be followed when adverse water quality is observed or detected during routine testing. Waterworks contract laboratories must notify the MOE, Wellington-Dufferin-Guelph Public Health (WDGPH), and the Waterworks Supervisor of the adverse result by phone. The Waterworks Supervisor must then again notify both by phone and in writing, the MOE and WDGPH of the adverse result and report on the conditions of operation at the time of sampling. If applicable, the Supervisor will then implement corrective actions such as resampling, increasing the chlorine dose, isolating a source, or flushing the system, whichever is appropriate. Waterworks must then report the results of the corrective actions taken to both the MOE and WDGPH within seven days of the issue's resolution.

When an adverse bacteriological or chemical result is detected, the first "corrective" action required under Schedule 17 of O. Reg. 170/03 is the resampling and testing of the source with the adverse result. It is the nature of both microbiological and chemical analysis to occasionally have false-positive results. If additional confirmatory adverse results are not detected, then routine monitoring resumes.

### **Guelph Well Supply Summary of Adverse Results and Corrective Actions**

In 2009, a total of 2 sample results were classified as adverse according to legislation or Waterworks policy (see Table I):

5. In two instances, UV dosing dropped below the minimum required dosage. One instance occurred at Water St. Well on May 19, 2009 and one instance occurred at F.M Woods station on July 17, 2009. In both instances, the UV dosing was restored to regulatory levels within minutes. On both occasions, the MOE and WDGPH were notified. No orders or directions were issued and no further action was required. It should be noted that these instances represent less than 0.0006% of the running time for ultraviolet disinfection units

### **Gazer Mooney System Summary of Adverse Results and Corrective Actions**

- There were no adverse sample indicators in the Gazer Mooney System for the period of January 1, 2009 to December 31, 2009

More detailed information on adverse test results is provided in the following Table I.

<b>Table I - 2009 Summary of Adverse Test Results and Corrective Actions - Guelph Well Supply</b>					
<b>#</b>	<b>Date</b>	<b>Location</b>	<b>Description</b>	<b>Corrective Action</b>	<b>Follow Up Monitoring Results</b>
1	May-19	Water St. Well	UV dosage below allowable limit of 40 mJ/cm <sup>2</sup>	Health Unit and MOE notified – Restore UV disinfection	UV disinfection restored within minutes
4	Jul-17	F.M. Woods Station	UV dosage below allowable limit of 24 mJ/cm <sup>2</sup>	Health Unit and MOE notified– Restore UV disinfection	UV disinfection restored within minutes
mj/cm <sup>2</sup> – millijoules per centimetre square					
<b>2009 Summary of Adverse Test Results and Corrective Actions - Gazer Mooney System</b>					
N/A	N/A	N/A	No Adverse results	N/A	N/A
N/A – not applicable					

**SECTION 6**  
**SUMMARY OF MAINTENANCE**

## **Section 6 Summary of Maintenance**

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This section summarizes the 2009 major operating and capital expenses incurred to maintain the water supply and distribution system.

The Waterworks Division of the Environmental Services Department is responsible for the supply and distribution of potable water to the citizens of Guelph. Water quality objectives established by the MOE are achieved through a combination of groundwater protection initiatives, disinfection of water from 19 groundwater wells and the maintenance of a distribution network consisting of almost 600 km of watermain. All Waterworks revenue is derived directly from the sale of water to customers and has been supplemented in recent years by government grants

The water programs and services described below contribute to the Waterworks and Wastewater vision:

“We will be a recognized leader in municipal water management, moving forward consistently at the forefront of our industry and setting a standard for others to follow.”

### **Regulatory Compliance**

In February 2002, the MOE issued a Consolidated Certificate of Approval (CC of A) to Waterworks based on the findings of the *2001 Engineers Report*. The CC of A has subsequently been amended numerous times to reflect the changes in the Guelph Water system. In 2009, the CC of A was replaced by the Municipal Drinking Water License (MDWL) and the Drinking Water Works Permit (DWWP). These documents have outlined or continue to outline the following requirements that have direct budgetary impact:

### **Operating Budget Highlights and Sustaining Infrastructure**

The Waterworks mission supports sustaining infrastructure to ensure reliable service. Over 80 percent of the water system is underground.

In 2009, Waterworks budgeted \$3.97 million and \$4.28 million to operate and maintain the water supply and distribution systems respectively.

The following maintenance activities were funded by the Waterworks Operating budget in 2009:

- Repair of 66 watermain breaks;
- Addition of 2.9 kilometres of new watermain;
- Replacement of 17 valves;
- Addition of 32 watermain valves;
- Repair of 41 fire hydrants;
- Addition of 28 hydrants;

- Addition of 660 new services;
- Removal of 2 services;
- Replacement of 1666 water meters;
- Installation of 660 new water meters;
- Removal of 16 water meters from demolished properties;
- Swabbing of 57 kilometres of watermain;
- Flushing of 42 km of watermain; and
- 86 Lead service line replacements.

No major maintenance was undertaken in the Gazer Mooney System except routine flushing and annual hydrant checks.

**SECTION 7**  
**COMPLIANCE WITH TERMS AND CONDITIONS OF THE**  
**CONSOLIDATED CERTIFICATE OF APPROVAL**  
**MUNICIPAL DRINKING WATER LICENSE AND**  
**DRINKING WATER WORKS PERMIT**

## **Section 7 Compliance with Terms and Conditions of the Consolidated Certificate of Approval**

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In 2009, the City of Guelph Waterworks (Waterworks) operated under three Consolidated Certificates of Approval (CC of A), one Municipal Drinking Water License (MDWL) and one Drinking Waterworks Permit (DWWP). For the period January, 1, 2009 to February 12, 2009 Waterworks operated under CC of A 8929-77MHN9. For the period of February 13, 2009 to June 2, 2009 Waterworks operated under the amended CC of A 5825-7APLWY. For the period of June 2, 2009 to August 27, 2009 Waterworks operated under the amended CC of A 5527-7S3P9C. For the period of August 28, 2009 to December 31, 2009 The Waterworks operated under MDWL 017-101 and the DWWP 017-201. The CC's of A, the MDWL and the DWWP are required system specific supplements to provincial regulations and act as licenses for water supply and distribution operations. These documents outline specific conditions and requirements regarding operation, maintenance and upgrades that are required by the system and are considered regulatory in nature

Copies of the most recent CCs of A and/or the MDWL and/or the DWWP are available at the City of Guelph Waterworks at 29 Waterworks Place for viewing upon request.

In 2009, Guelph Waterworks complied with all terms and conditions of each of the CCs of A, MDWL and the DWWP with the exception of two instances drops in UV dose (see Table I). The following section briefly summarizes Waterworks' compliance with the main terms and conditions as listed in the various documents.

### ***Certificate of Approval Part 1 – Drinking-Water System Description***

The first section of the CC of A describes the various parts of the drinking water system operated by the City.

### ***Certificate of Approval Part 2 – Definitions and Information***

This section of the CC of A provides standard MOE definitions of terms used in the CC of A.

### ***Certificate of Approval Part 3 - General***

In 2009, Waterworks informed contractors working on the water supply and distribution systems of the requirements of regulations and legislation related to the work being conducted.

In accordance with Part 3 – General, Guelph Waterworks operated the drinking water system in accordance with the *Safe Drinking-Water Act, 2002*. Over 22000 water quality tests were performed on Guelph drinking water in 2009. The results demonstrate that Guelph public distribution system water is safe, and are summarized in tables provided in

Section 4 of this report. As well, Guelph Waterworks had valid Permits to Take Water for all municipal water supplies at the rates listed in the CC of A.

A copy of the CC of A was “kept in a conspicuous place so that it [was] available for reference by all persons responsible for all or part of the operation of the approved drinking-water system”.

All records required by or related to regulatory compliance in accordance with the CC of A have been, and are being retained for a minimum of five years. Waterworks continues to maintain all records and information related to water quality monitoring, sampling and analyzing programs for a minimum period of five years.

#### *Certificate of Approval Part 4 – Performance*

In accordance with Part 4 – Performance, Guelph Waterworks ensured that distribution system flows did not exceed the maximum flow rates as set out in the CC of A, *Table 4.1: Rated Capacities*.

In accordance with Part 4.4 – Performance, Guelph Waterworks ensured that in 2009 the UV disinfection equipment operated at Emma and Water wells and provided a minimum dose of 40 mJ/cm<sup>2</sup> at all times, and 24 mJ/cm<sup>2</sup> at F.M. with the exception of those incidents listed in Table I. Disinfection by chlorination was maintained during these times.

#### *Certificate of Approval Part 5 – Monitoring and Recording*

In accordance with Part 5 – Monitoring and Recording, Guelph Waterworks operated and maintained devices to measure flow rate and daily quantity of water being supplied from each source. All flow measuring devices were checked and calibrated in accordance with the manufacturers’ instructions. In 2009, Waterworks verified the accuracy of each flow measuring device.

In 2009, Waterworks recorded total daily flows at each water supply. This information is provided in summary tables included in Appendix A and B of this report.

In accordance with Part 5.5 – Monitoring and Recording, Guelph Waterworks collected UV performance and flow data at the frequency outlined in the CC of A.

In accordance with Part 5.6 – Monitoring and Recording, Guelph Waterworks collected Arkell recharge and collector water quality data as mandated by the CC of A.

#### *Certificate of Approval Part 6 – Operations and Maintenance*

In accordance with Part 6 – Operations and Maintenance, Guelph Waterworks ensured that all chemicals used in the operation of the drinking water system met all applicable standards set by the American Water Works Association (AWWA) and the American National Standards Institute (ANSI) safety criteria standards NSF/60 and NSF/61.

With regard to new stock, materials and infrastructure, Waterworks ensured that all new equipment, materials and chemicals comply with the AWWA and ANSI standards.

As well, an up-to date operations manual including all information required by the CC of A, the MDWL or the DWWP was maintained and available for reference by all persons responsible for all or part of the operation of the approved drinking-water system. As part of the operations manual, Waterworks maintained documentation and procedures for responding to customer complaints.

Waterworks maintained procedures for receiving, responding to, and documenting customer complaints. Staff received customer complaints and entered relevant information into the complaints database. This database allowed management to track and resolve issues and review trends in complaint information.

In 2009, a total of 359 complaints were recorded in the complaints database for both Guelph Well Supply and the Gazer Mooney System. Many of these complaints were related to discoloured water caused by disruption of sediment in water mains. The following Table J summarizes the types of complaints received in 2009. "Other" refers to customer inquiries related to health concerns, water meters and general information requests.

<b>TABLE J - 2009 Customer Water Quality Complaints Summary</b>		
<b>Number</b>	<b>Complaint Type</b>	<b>Complaint Group</b>
76	Water is Yellow, Brown, Black, White, Sandy	Appearance
4	Water Tastes of Chlorine, Sulphur, Metal, Stale	Taste/Odour
13	Water Pressure	Pressure
8	Meters, Hydrants, Other	Leaks
57	Watermain Breaks/service leaks	Suspected Main Breaks
201	Request for Shut Offs and Turn Ons, Inquiries, Other	Miscellaneous

Additionally, up-to-date Process and Instrumentation Diagrams and as-constructed drawings for the drinking water system were kept on site at each drinking water facility.

In 2009, Guelph Waterworks continued to follow written standard operating procedures for the notification of both the MOE and local health unit in the event of adverse water quality as defined by the Drinking Water Systems regulation.

Further, Guelph Waterworks continued to develop the Waterworks Emergency Plan to support the overall City of Guelph Emergency Plan. Staff training was provided on standard operating procedures related to incident and emergency response.

As well, Guelph Waterworks ensured the availability of adequate equipment and materials to assist with incident and emergency response.

*Certificate of Approval Part 7 – Future Alterations*

In 2009, there were no applicable terms and references included in Part 7 – Future Alterations.

*Certificate of Approval Part 8 – Studies and Upgrades Required (for historical reference only).*

As required by condition 8.3 of the current CC of A, the installation of enhanced disinfection upgrades for the Carter Wells and Arkell Glen collector system commenced in 2004. These upgrades were completed in 2008.

As required by condition 8.5 (i) of the previous CC of A, the installation of backflow prevention devices on reservoir overflows was completed in October 2004. Re-chlorination system upgrades at Paisley Pumping Station and Robertson Booster Pumping Station were completed in October and November 2004 respectively.

The control system facility upgrades were completed by the mandatory deadline (December 31, 2006) to provide minimum functionality and alarming. The installation of further enhancements to the system is ongoing.

The correction of deficiencies with the Arkell Glenn Collectors was completed after the installation of the Arkell Glenn Collectors flow diversion chamber in 2008. The flow diversion chamber was constructed as part of the enhanced disinfection upgrade of the Arkell Glenn Collectors.

Please note that the CC of A was eliminated for Guelph Waterworks in August of 2009 as part of the Municipal Drinking Water Licensing legislation. The same requirements outlined in the CC of A were separated into the MDWL and DWWP. In addition, the approvals process for alterations to the water system was changed to allow operating authorities to better manage their respective systems. For a complete review of the changes please refer to the Ministry of the Environment website or contact the City of Guelph Waterworks.

**SECTION 8  
NON-COMPLIANCE WITH TERMS  
AND CONDITIONS OF THE CONSOLIDATED CERTIFICATE  
OF APPROVAL AND REGULATIONS**

## Section 8 Non-Compliance with Terms and Conditions of the Certificate of Approval and Regulations

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This section of the Summary Report consists of a short description of issues of non-compliance with the terms and conditions as listed in the CC of A and with applicable provincial regulations.

### **MOE Annual Inspection and Non -Compliance with Acts and Regulations – Guelph Well Supply**

In 2009, Guelph Waterworks had 8 instances of non-compliance with Ministry of the Environment regulations regarding drinking water as indicated by the Annual MOE Inspection Report. Only two of these instances were considered “adverse” results under the regulations. As a result, the Guelph Well Supply received a final inspection score of 93.74%, an increase of 1.9% from 2008. No MOE orders were issued. The eight noted instances of non-compliance were of three types and included:

1. Non-compliance with a condition of a CC of A or MDWL. In two instances, UV dosing dropped below the minimum required dosage. One instance occurred at Water St. Well on May 19, 2009 and one instance occurred at F.M Woods Station on July 17, 2009. In both instances, the UV dosing was restored to regulatory levels within minutes. UV treatment failures are considered adverse events and on both occasions the MOE and Wellington-Dufferin-Guelph Public Health were notified (see Table I). No orders or directions were issued and no further action was required by City of Guelph. It should be noted that these instances represent less than 0.0006% of the running time for ultraviolet disinfection units.
2. Non-compliance with a regulation (O. Reg 170/03). In one instance, one monthly raw water turbidity sample at Queensdale Well was taken 41 days after the previous sample was taken. The maximum allowable interval between raw turbidity samples is 40 days – the MOE was informed. There was no health impact and no further action was required.
3. Non-compliance with a condition in a Permit to Take Water. In one instance, a well water level related to a Permit to Take Water (PTTW) requirement was taken 38 days after the previous water level was taken. The maximum allowable interval between water levels is 20 days. The MOE noted the interval during the 2009/2010 inspection. There was no health impact and no further action was required.
4. Non-compliance with a regulation (O. Reg 170/03). The MOE Inspector noted that at four locations, the automatic station shutdown protections were not configured in a manner outlined by the regulations. It was noted during testing that following a power interruption to the continuous chlorine analyzers, the stations would restart automatically if all other safety parameters were in their appropriate ranges. The regulation stipulates that regardless of other safety parameters, the station may not restart unless an operator has been dispatched to the site to evaluate the shutdown condition. The shutdown protections were reconfigured prior to the conclusion of the inspection to comply with the regulation.

**MOE Annual Inspection and Non -Compliance with Acts and Regulations – Gazer Mooney System**

In 2009, the Gazer Mooney System had no instances of non-compliance with Ministry of the Environment regulations regarding drinking water. As a result, the Gazer Mooney System received a final inspection score of 100.00%. No orders were issued

**SECTION 9**  
**SUMMARY OF SODIUM ANALYTICAL RESULTS**

## Section 9 Summary of Sodium Analytical Results

Guelph Waterworks is required to periodically report to Wellington-Dufferin-Guelph Public Health (WDGPH) the sodium sampling results for all facilities. This information has been incorporated into this Summary Report in order to effectively disseminate this information to all Waterworks customers and other interested parties. The MOE requires that sodium sampling be conducted every five years for all points of entry into the water distribution system. The maximum results of the 2009 sampling are included in Table K.

<b>Table K – Guelph Well Supply Maximum Sodium Results</b>	
<u>Facility</u>	2009 Maximum Sodium Concentration (mg/L)
Burkes Well (treated)	28
Downey Well (treated)	43
University Well (treated)	76
Dean Well (treated)	110
Membro Well (treated)	130
Water Street Well (treated)	84
Paisley Station	55
Queensdale Well (treated)	40
Calico Well (treated)	30
Helmar Well (treated)	30
Park Wells (combined, treated)	120
Emma Well (treated)	65
F.M. Woods Station (treated)	15

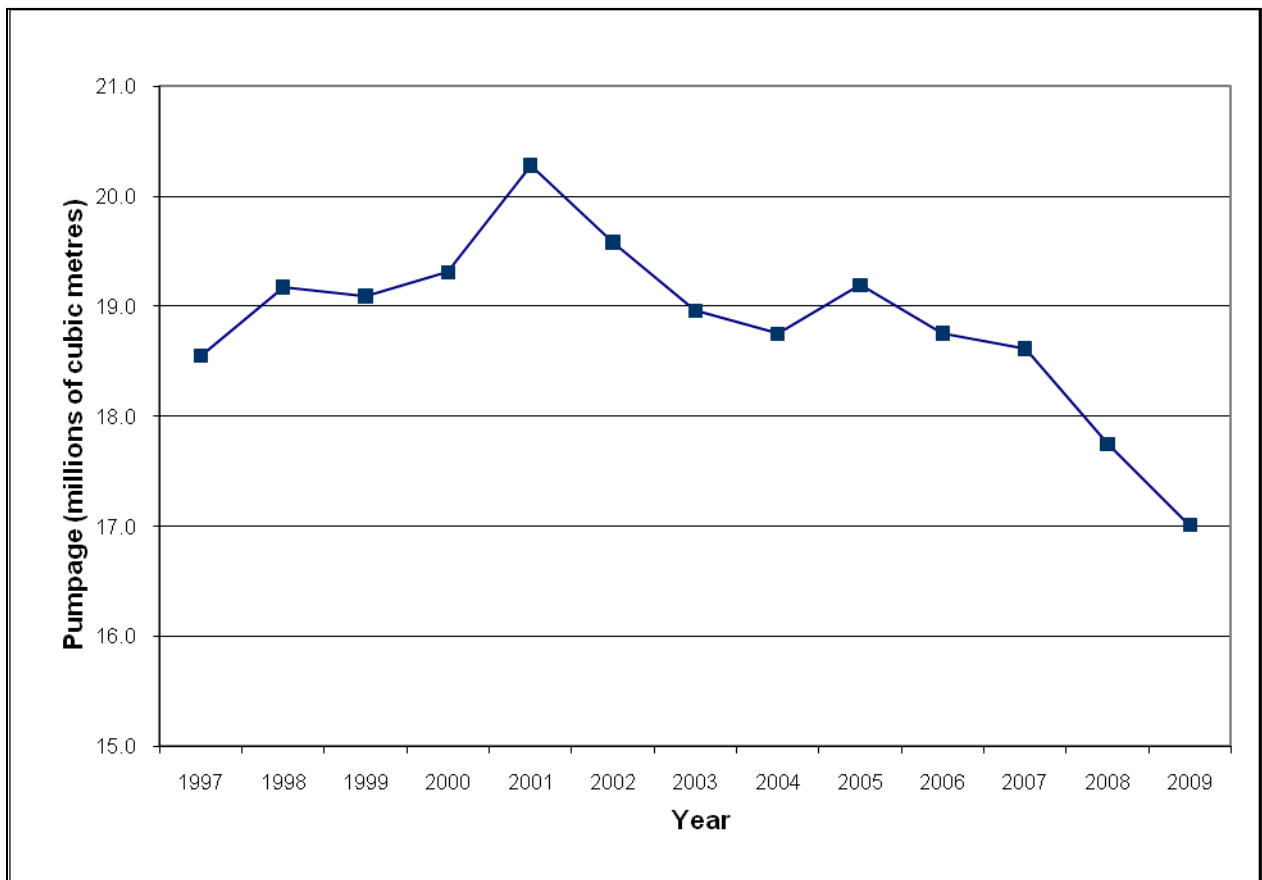
Note: Sodium values are reportable every five years when values are above 20mg/L. Reporting times to the Ministry of the Environment vary from location to location based on the time of the last report and the value of sodium in the source water. Sodium is measured for operational purposes on an annual frequency at all sources – as per above, values above 20mg/L do not necessarily require additional reporting.

**SECTION 10**  
**SUMMARY OF QUANTITY OF WATER SUPPLIED**

## Section 10 Summary of Quantity of Water Supplied

In 2009, 19 water supplies were operated to satisfy customer water demand. In 2009, a total of 17.01 million cubic metres of water was pumped and treated. Unaccounted for water (pumped from sources but not metered at an end user) totalled approximately 14 percent of all water pumped. The average daily water demand was 46607 cubic metres. The highest daily use of water occurred on June 24 during which 55337 cubic metres of water was pumped. This is 5.31 percent lower than the maximum pumpage day of 2008. A graph showing the ten year trend in total water pumpage is shown in Figure C.

**Figure C - Ten Year Trend of Total Annual Water Pumpage**



Tables L and M located in Appendix A detail 2009 monthly pumpage summaries from all active water supplies. Table N in Appendix B details 2009 monthly maximum instantaneous flow from all active water supplies.

**APPENDIX A**  
**2009 MONTHLY PUMPAGE SUMMARIES**

<b>Table L – Summary of Daily Pumpages by Month (m<sup>3</sup>) for Treated Water to the Distribution System</b>					
		<b>Total System Pumpage</b>	<b>Burkes Booster</b>	<b>Calico Booster</b>	<b>Clythe Discharge</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<i>N/A</i>	<b>6546</b>	<b>5237</b>	<i>N/A</i>
<b>January</b>	<b>MAX</b>	54273	5426	750	3743
	<b>AVG</b>	47893	5320	728	3495
	<b>TOTAL</b>	1484692	164916	22577	108357
<b>February</b>	<b>MAX</b>	52339	5608	846	3714
	<b>AVG</b>	48540	5391	713	3393
	<b>TOTAL</b>	1359119	150947	19971	95007
<b>March</b>	<b>MAX</b>	51228	5338	846	3693
	<b>AVG</b>	48045	5309	836	3246
	<b>TOTAL</b>	1489388	164567	25930	100615
<b>April</b>	<b>MAX</b>	51228	5338	846	3693
	<b>AVG</b>	46856	5306	716	3065
	<b>TOTAL</b>	1405669	159167	21491	91945
<b>May</b>	<b>MAX</b>	51677	5335	757	3482
	<b>AVG</b>	45405	4887	723	3195
	<b>TOTAL</b>	1407569	151497	22415	99044
<b>June</b>	<b>MAX</b>	55337	5243	740	3383
	<b>AVG</b>	47511	4873	712	2993
	<b>TOTAL</b>	1425334	146182	21358	89787
<b>July</b>	<b>MAX</b>	55337	5243	740	3383
	<b>AVG</b>	46079	4498	696	3350
	<b>TOTAL</b>	1428454	139448	21565	103857
<b>August</b>	<b>MAX</b>	51059	5383	847	3579
	<b>AVG</b>	46103	4691	801	3189
	<b>TOTAL</b>	1429200	145416	24843	98863
<b>September</b>	<b>MAX</b>	55203	5394	1699	3367
	<b>AVG</b>	49294	5340	1171	2958
	<b>TOTAL</b>	1478822	160199	35129	88745
<b>October</b>	<b>MAX</b>	49678	5348	844	4541
	<b>AVG</b>	45926	3620	485	2542
	<b>TOTAL</b>	1423691	112214	15044	78816
<b>November</b>	<b>MAX</b>	48371	5237	862	4487
	<b>AVG</b>	45760	1292	788	3965
	<b>TOTAL</b>	1372807	38749	23645	118964
<b>December</b>	<b>MAX</b>	50450	5278	809	4587
	<b>AVG</b>	42161	1743	775	3990
	<b>TOTAL</b>	1306992	54048	24033	123696
	<b>Annual Max Day</b>	55337	<b>5608</b>	<b>1699</b>	<b>5199</b>
	<b>Annual Avg Day</b>	46607.49863	<b>4349</b>	<b>762</b>	<b>3281</b>
	<b>Annual Total</b>	17011737	<b>1587350</b>	<b>278000</b>	<b>1197697</b>

<b>Table L – Summary of Daily Pumpages by Month (m<sup>3</sup>) for Treated Water to the Distribution System (continued)</b>					
		<b>Dean Booster</b>	<b>Downey Booster Pump</b>	<b>Emma Well Pump</b>	<b>Helmar Booster Pump</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<b>2300</b>	<b>5237</b>	<b>3100</b>	<b>3273</b>
<b>January</b>	<b>MAX</b>	1452	4210	2905	732
	<b>AVG</b>	1252	4192	1537	50
	<b>TOTAL</b>	38824	129956	47657	1557
<b>February</b>	<b>MAX</b>	1433	4187	2790	32
	<b>AVG</b>	1419	4167	1774	7
	<b>TOTAL</b>	39726	116672	49674	191
<b>March</b>	<b>MAX</b>	1424	4178	2854	1018
	<b>AVG</b>	1405	4129	1603	72
	<b>TOTAL</b>	43561	128010	49692	2226
<b>April</b>	<b>MAX</b>	1424	4178	2854	1018
	<b>AVG</b>	1388	4077	1423	688
	<b>TOTAL</b>	41637	122300	42704	20630
<b>May</b>	<b>MAX</b>	1382	4090	2852	990
	<b>AVG</b>	1340	3935	487	449
	<b>TOTAL</b>	41541	121987	15092	13914
<b>June</b>	<b>MAX</b>	1363	3877	2838	1191
	<b>AVG</b>	1300	3861	1575	974
	<b>TOTAL</b>	38990	115829	47246	29221
<b>July</b>	<b>MAX</b>	1363	3877	2838	1191
	<b>AVG</b>	1316	3847	1427	870
	<b>TOTAL</b>	40785	119252	44236	26966
<b>August</b>	<b>MAX</b>	1284	3867	2733	908
	<b>AVG</b>	1241	3672	1792	622
	<b>TOTAL</b>	38470	113842	55542	19282
<b>September</b>	<b>MAX</b>	1285	3862	2734	912
	<b>AVG</b>	1243	3833	2173	798
	<b>TOTAL</b>	37293	115001	65191	23925
<b>October</b>	<b>MAX</b>	1219	3831	2703	749
	<b>AVG</b>	1199	3700	2675	662
	<b>TOTAL</b>	37171	114714	82933	20536
<b>November</b>	<b>MAX</b>	1185	4224	2657	847
	<b>AVG</b>	1129	3779	2597	709
	<b>TOTAL</b>	33867	113381	77907	21268
<b>December</b>	<b>MAX</b>	1183	4636	2662	715
	<b>AVG</b>	1111	4297	1888	702
	<b>TOTAL</b>	34439	133200	58517	21750
	<b>Annual Max Day</b>	<b>1452</b>	<b>4636</b>	<b>2905</b>	<b>1191</b>
	<b>Annual Avg Day</b>	<b>1278</b>	<b>3957</b>	<b>1744</b>	<b>552</b>
	<b>Annual Total</b>	<b>466303</b>	<b>1444144</b>	<b>636392</b>	<b>201466</b>

<b>Table L – Summary of Daily Pumpages by Month (m<sup>3</sup>) for Treated Water to the Distribution System (continued)</b>					
		<b>Membro Booster</b>	<b>Robertson Booster Station</b>	<b>Paisley Station Discharge</b>	<b>Park Booster Pump</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<b>6050</b>	<b>N/A</b>	<b>13738</b>	<b>10300</b>
<b>January</b>	<b>MAX</b>	3629	6835	4549	6815
	<b>AVG</b>	3077	5884	3491	5603
	<b>TOTAL</b>	95378	182418	108230	173681
<b>February</b>	<b>MAX</b>	3556	7571	6376	6799
	<b>AVG</b>	3545	6066	3813	6758
	<b>TOTAL</b>	99257	169836	106767	189220
<b>March</b>	<b>MAX</b>	3553	6585	4008	6736
	<b>AVG</b>	3465	5992	3480	6359
	<b>TOTAL</b>	107423	185744	107888	197133
<b>April</b>	<b>MAX</b>	3553	6585	4008	6736
	<b>AVG</b>	2392	5746	3689	6773
	<b>TOTAL</b>	71772	172377	110657	203198
<b>May</b>	<b>MAX</b>	3893	6875	4593	7610
	<b>AVG</b>	2151	6190	3514	4855
	<b>TOTAL</b>	66695	191895	108920	150490
<b>June</b>	<b>MAX</b>	3741	8740	5524	8372
	<b>AVG</b>	2845	6253	3694	6598
	<b>TOTAL</b>	85354	187595	110814	197935
<b>July</b>	<b>MAX</b>	3741	8740	5524	8372
	<b>AVG</b>	3242	5534	3948	6006
	<b>TOTAL</b>	100502	171551	122373	186180
<b>August</b>	<b>MAX</b>	3635	7106	4897	9376
	<b>AVG</b>	2637	5936	3941	6968
	<b>TOTAL</b>	81741	184017	122161	216014
<b>September</b>	<b>MAX</b>	3492	8054	5898	8568
	<b>AVG</b>	3464	6089	3732	7200
	<b>TOTAL</b>	103911	182657	111971	215990
<b>October</b>	<b>MAX</b>	3550	6616	7074	8102
	<b>AVG</b>	3296	5193	4858	6956
	<b>TOTAL</b>	102186	160994	150608	215638
<b>November</b>	<b>MAX</b>	3504	5261	3792	8039
	<b>AVG</b>	3443	4632	3215	7326
	<b>TOTAL</b>	103296	138956	96442	219774
<b>December</b>	<b>MAX</b>	3523	5950	4891	8207
	<b>AVG</b>	3504	4359	3035	7658
	<b>TOTAL</b>	108620	135121	94088	237412
	<b>Annual Max Day</b>	<b>3893</b>	<b>8740</b>	<b>7074</b>	<b>9376</b>
	<b>Annual Avg Day</b>	<b>3085</b>	<b>5652</b>	<b>3701</b>	<b>6583</b>
	<b>Annual Total</b>	<b>1126135</b>	<b>2063159</b>	<b>1350919</b>	<b>2402666</b>

<b>Table L – Summary of Daily Pumpages by Month (m<sup>3</sup>) for Treated Water to the Distribution System (continued)</b>					
		<b>Queensdale Booster</b>	<b>University Booster</b>	<b>Water Street</b>	<b>F.M. Woods Station</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<b>5237</b>	<b>5108</b>	<b>3400</b>	<b>65000</b>
<b>January</b>	<b>MAX</b>	808	1935	2056	30180
	<b>AVG</b>	341	1814	1148	22254
	<b>TOTAL</b>	10559	56248	35601	689870
<b>February</b>	<b>MAX</b>	905	1771	2198	22450
	<b>AVG</b>	664	1750	1329	19790
	<b>TOTAL</b>	18589	48997	37205	554120
<b>March</b>	<b>MAX</b>	858	1759	2264	26650
	<b>AVG</b>	761	1736	1268	19915
	<b>TOTAL</b>	23604	53825	39303	617350
<b>April</b>	<b>MAX</b>	858	1759	2264	26650
	<b>AVG</b>	847	1757	837	19409
	<b>TOTAL</b>	25400	52723	25115	582280
<b>May</b>	<b>MAX</b>	973	1881	2164	27360
	<b>AVG</b>	945	1857	143	22445
	<b>TOTAL</b>	29282	57567	4440	695800
<b>June</b>	<b>MAX</b>	943	1857	2327	23590
	<b>AVG</b>	692	1729	1115	19851
	<b>TOTAL</b>	20772	51864	33440	595530
<b>July</b>	<b>MAX</b>	943	1857	2327	23590
	<b>AVG</b>	0	1747	1127	20123
	<b>TOTAL</b>	0	54148	34941	623820
<b>August</b>	<b>MAX</b>	1025	1749	2616	24060
	<b>AVG</b>	285	1711	1506	18308
	<b>TOTAL</b>	8820	53039	46692	567550
<b>September</b>	<b>MAX</b>	1058	1773	2164	22260
	<b>AVG</b>	1015	1733	1686	18538
	<b>TOTAL</b>	30438	51975	50595	556140
<b>October</b>	<b>MAX</b>	1062	1961	2116	22990
	<b>AVG</b>	1016	1760	1745	17705
	<b>TOTAL</b>	31490	54558	54110	548850
<b>November</b>	<b>MAX</b>	966	2029	1993	22970
	<b>AVG</b>	897	1486	1899	19262
	<b>TOTAL</b>	26913	44570	56984	577860
<b>December</b>	<b>MAX</b>	962	1737	2653	22590
	<b>AVG</b>	408	1715	1206	16195
	<b>TOTAL</b>	12649	53175	37397	502054
	<b>Annual Max Day</b>	<b>1062</b>	<b>2029</b>	2653	<b>30180</b>
	<b>Annual Avg Day</b>	<b>653</b>	<b>1733</b>	1248.83103	<b>19483</b>
	<b>Annual Total</b>	<b>238516</b>	<b>632690</b>	455823.324	<b>7111224</b>

<b>Table M – Summary of Daily Pumpages by Month for Wells</b>					
		<b>Arkell Well 1</b>	<b>Arkell Well 6</b>	<b>Arkell Well 7</b>	<b>Arkell Well 8</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<b>3273</b>	<b>6546</b>	<b>6546</b>	<b>6546</b>
<b>January</b>	<b>MAX</b>	1274	5670	5369	6100
	<b>AVG</b>	778	4332	4108	4917
	<b>TOTAL</b>	24103	134280	127346	152420
<b>February</b>	<b>MAX</b>	1245	5126	5433	5600
	<b>AVG</b>	831	2604	3979	4691
	<b>TOTAL</b>	23279	72909	111423	131340
<b>March</b>	<b>MAX</b>	1246	5349	5445	5730
	<b>AVG</b>	679	2465	3465	3719
	<b>TOTAL</b>	21044	76428	107421	115300
<b>April</b>	<b>MAX</b>	1246	5349	5445	5730
	<b>AVG</b>	106	1649	1974	2642
	<b>TOTAL</b>	3178	49468	59234	79250
<b>May</b>	<b>MAX</b>	27	2985	3903	5690
	<b>AVG</b>	1	645	1314	2014
	<b>TOTAL</b>	45	19992	40725	62430
<b>June</b>	<b>MAX</b>	1199	2365	3539	2990
	<b>AVG</b>	77	968	2301	1684
	<b>TOTAL</b>	2308	29039	69032	50520
<b>July</b>	<b>MAX</b>	1199	2365	3539	2990
	<b>AVG</b>	287	1836	1303	2554
	<b>TOTAL</b>	8912	56926	40379	79160
<b>August</b>	<b>MAX</b>	1225	3626	3965	4150
	<b>AVG</b>	452	1344	2088	2833
	<b>TOTAL</b>	14008	41668	64714	87828
<b>September</b>	<b>MAX</b>	1194	3609	4183	4550
	<b>AVG</b>	1151	1929	2852	3350
	<b>TOTAL</b>	34534	57858	85557	100510
<b>October</b>	<b>MAX</b>	1194	4326	4600	5150
	<b>AVG</b>	747	1895	2648	3234
	<b>TOTAL</b>	23169	58736	82080	100260
<b>November</b>	<b>MAX</b>	1192	5134	5192	5550
	<b>AVG</b>	1018	3072	3732	3947
	<b>TOTAL</b>	30537	92174	111970	118420
<b>December</b>	<b>MAX</b>	1186	5808	5823	6230
	<b>AVG</b>	1144	4275	4649	4815
	<b>TOTAL</b>	35458	132526	144106	149270
	<b>Annual Max Day</b>	<b>1274</b>	<b>5808</b>	<b>5823</b>	<b>6230</b>
	<b>Annual Avg Day</b>	<b>604</b>	<b>2252</b>	<b>2860</b>	<b>3361</b>
	<b>Annual Total</b>	<b>220575</b>	<b>822004</b>	<b>1043987</b>	<b>1226708</b>

<b>Table M – Summary of Daily Pumpages by Month for Wells (continued)</b>					
		<b>Arkell Recharge Pump</b>	<b>Arkell Collectors</b>	<b>Burkes Well</b>	<b>Calico Well</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<i>varies - lowest value 9092</i>	<b>25000</b>	<b>6546</b>	<b>5273</b>
<b>January</b>	<b>MAX</b>	0	10762	5400	742
	<b>AVG</b>	0	9386	5205	717
	<b>TOTAL</b>	0	290959	161345	22215
<b>February</b>	<b>MAX</b>	0	10465	5492	847
	<b>AVG</b>	0	9651	5264	712
	<b>TOTAL</b>	0	270225	147401	19935
<b>March</b>	<b>MAX</b>	0	13243	5236	847
	<b>AVG</b>	0	12038	5179	827
	<b>TOTAL</b>	0	373164	160535	25627
<b>April</b>	<b>MAX</b>	0	13243	5236	847
	<b>AVG</b>	2088	14012	5172	708
	<b>TOTAL</b>	62646	420358	155145	21237
<b>May</b>	<b>MAX</b>	7709	22226	5242	755
	<b>AVG</b>	7099	20685	4761	714
	<b>TOTAL</b>	220071	641239	147588	22147
<b>June</b>	<b>MAX</b>	8151	18865	5126	746
	<b>AVG</b>	3979	13284	4744	709
	<b>TOTAL</b>	119371	398530	142324	21269
<b>July</b>	<b>MAX</b>	8151	18865	5126	746
	<b>AVG</b>	7295	12899	4379	696
	<b>TOTAL</b>	226132	399868	135754	21581
<b>August</b>	<b>MAX</b>	7665	15691	5252	856
	<b>AVG</b>	6498	10348	4570	794
	<b>TOTAL</b>	201437	320799	141657	24608
<b>September</b>	<b>MAX</b>	7577	10532	5280	1714
	<b>AVG</b>	3775	8088	5217	1168
	<b>TOTAL</b>	113237	242654	156524	35048
<b>October</b>	<b>MAX</b>	7775	13049	5232	872
	<b>AVG</b>	6302	10099	3531	498
	<b>TOTAL</b>	195376	313071	109456	15436
<b>November</b>	<b>MAX</b>	7698	122253	5116	993
	<b>AVG</b>	3145	13282	1271	786
	<b>TOTAL</b>	94357	398454	38132	23576
<b>December</b>	<b>MAX</b>	0	9956	5179	811
	<b>AVG</b>	0	5849	1706	771
	<b>TOTAL</b>	0	181310	52882	23888
	<b>Annual Max Day</b>	<b>8738</b>	<b>122253</b>	<b>5492</b>	<b>1714</b>
	<b>Annual Avg Day</b>	<b>3377</b>	<b>11646</b>	<b>4243</b>	<b>758</b>
	<b>Annual Total</b>	<b>1232627</b>	<b>4250631</b>	<b>1548743</b>	<b>276568</b>

<b>Table M – Summary of Daily Pumpages by Month for Wells (continued)</b>					
		<b>Carter Wells Combined</b>	<b>Dean Well</b>	<b>Downey Well</b>	<b>Emma Well</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<b>7856</b>	<b>2300</b>	<b>5273</b>	<b>3100</b>
<b>January</b>	<b>MAX</b>	5482	1609	4197	2905
	<b>AVG</b>	1744	1252	4179	1537
	<b>TOTAL</b>	54078	38801	129537	47657
<b>February</b>	<b>MAX</b>	85	1445	4173	2790
	<b>AVG</b>	3	1407	4153	1774
	<b>TOTAL</b>	85	39403	116286	49674
<b>March</b>	<b>MAX</b>	0	1436	4168	2854
	<b>AVG</b>	0	1399	4120	1603
	<b>TOTAL</b>	0	43383	127711	49692
<b>April</b>	<b>MAX</b>	0	1436	4168	2854
	<b>AVG</b>	977	1387	4068	1423
	<b>TOTAL</b>	29311	41620	122042	42704
<b>May</b>	<b>MAX</b>	5671	1388	4082	2852
	<b>AVG</b>	277	1330	3927	487
	<b>TOTAL</b>	8587	41243	121751	15092
<b>June</b>	<b>MAX</b>	6433	1383	3867	2838
	<b>AVG</b>	3493	1292	3852	1575
	<b>TOTAL</b>	104798	38747	115566	47246
<b>July</b>	<b>MAX</b>	6433	1383	3867	2838
	<b>AVG</b>	3402	1304	3839	1427
	<b>TOTAL</b>	105451	40418	119021	44236
<b>August</b>	<b>MAX</b>	3870	1301	3857	2733
	<b>AVG</b>	3439	1245	3665	1792
	<b>TOTAL</b>	106621	38592	113609	55542
<b>September</b>	<b>MAX</b>	3651	1300	3853	2734
	<b>AVG</b>	3190	1251	3825	2173
	<b>TOTAL</b>	95687	37541	114737	65191
<b>October</b>	<b>MAX</b>	3658	1230	3822	2703
	<b>AVG</b>	2164	1201	3720	2675
	<b>TOTAL</b>	67094	37226	115333	82933
<b>November</b>	<b>MAX</b>	0	1196	4218	2657
	<b>AVG</b>	0	1068	3773	2597
	<b>TOTAL</b>	0	32039	113204	77907
<b>December</b>	<b>MAX</b>	1994	1201	4625	2662
	<b>AVG</b>	1437	1113	4287	1888
	<b>TOTAL</b>	44540	33397	132910	58517
	<b>Annual Max Day</b>	<b>6433</b>	<b>1609</b>	<b>4625</b>	<b>2905</b>
	<b>Annual Avg Day</b>	<b>1688</b>	<b>1270</b>	<b>3950</b>	<b>1744</b>
	<b>Annual Total</b>	<b>616253</b>	<b>462410</b>	<b>1441707</b>	<b>636392</b>

<b>Table M – Summay of Daily Pumpages by Month for Wells (continued)</b>					
		<b>Helmar Well</b>	<b>Membro Well</b>	<b>Paisley Well</b>	<b>Park Wells Combined</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<b>3273</b>	<b>6050</b>	<b>3200</b>	<b>10300</b>
<b>January</b>	<b>MAX</b>	732	3543	1217	6747
	<b>AVG</b>	53	2916	653	5482
	<b>TOTAL</b>	1647	90386	20245	169948
<b>February</b>	<b>MAX</b>	238	3367	1193	6788
	<b>AVG</b>	29	3352	1192	6655
	<b>TOTAL</b>	814	93842	33362	186352
<b>March</b>	<b>MAX</b>	1010	3368	1190	6672
	<b>AVG</b>	71	3276	1188	6223
	<b>TOTAL</b>	2198	101564	36827	192905
<b>April</b>	<b>MAX</b>	1010	3368	1190	6672
	<b>AVG</b>	676	2256	1185	6679
	<b>TOTAL</b>	20268	67694	35561	200376
<b>May</b>	<b>MAX</b>	991	3684	1191	7513
	<b>AVG</b>	443	2022	1188	4821
	<b>TOTAL</b>	13730	62674	36843	149464
<b>June</b>	<b>MAX</b>	1166	3542	1187	8425
	<b>AVG</b>	958	2682	1151	6576
	<b>TOTAL</b>	28747	80473	34538	197292
<b>July</b>	<b>MAX</b>	1166	3542	1187	8425
	<b>AVG</b>	856	3061	1127	5986
	<b>TOTAL</b>	26523	94887	34926	185562
<b>August</b>	<b>MAX</b>	900	3437	1167	9356
	<b>AVG</b>	612	2494	1160	6944
	<b>TOTAL</b>	18971	77319	35963	215270
<b>September</b>	<b>MAX</b>	900	3313	1183	8637
	<b>AVG</b>	784	3284	1157	7171
	<b>TOTAL</b>	23524	98511	34721	215141
<b>October</b>	<b>MAX</b>	741	3382	1164	8193
	<b>AVG</b>	653	3126	1159	6913
	<b>TOTAL</b>	20236	96909	35944	214302
<b>November</b>	<b>MAX</b>	835	3331	1159	7961
	<b>AVG</b>	697	3271	1108	7244
	<b>TOTAL</b>	20898	98142	33241	217329
<b>December</b>	<b>MAX</b>	723	3351	1159	8195
	<b>AVG</b>	687	3301	1156	7474
	<b>TOTAL</b>	21293	102338	35842	231684
	<b>Annual Max Day</b>	<b>1191</b>	<b>3684</b>	<b>1217</b>	<b>9356</b>
	<b>Annual Avg Day</b>	<b>552</b>	<b>2917</b>	<b>1118</b>	<b>6509</b>
	<b>Annual Total</b>	<b>201466</b>	<b>1064739</b>	<b>408012</b>	<b>2375626</b>

<b>Table N - Monthly Flows (L/s) for Wells (Before Treatment)</b>					
		<b>Queensdale Well</b>	<b>University Well</b>	<b>Water Street Well</b>	<b>Clythe Well</b>
	<i>Regulatory Limit (m<sup>3</sup>)</i>	<b>5237</b>	<b>3300</b>	<b>3400</b>	<b>3400</b>
<b>January</b>	<b>MAX</b>	800	2083	2056	0
	<b>AVG</b>	368	1850	1148	0
	<b>TOTAL</b>	11400	57357	35601	0
<b>February</b>	<b>MAX</b>	800	1892	2198	0
	<b>AVG</b>	629	1791	1329	0
	<b>TOTAL</b>	17600	50146	37205	0
<b>March</b>	<b>MAX</b>	800	1861	2264	0
	<b>AVG</b>	748	1782	1268	0
	<b>TOTAL</b>	23200	55235	39303	0
<b>April</b>	<b>MAX</b>	800	1861	2264	0
	<b>AVG</b>	747	1798	837	0
	<b>TOTAL</b>	22400	53936	25115	0
<b>May</b>	<b>MAX</b>	800	2019	2164	0
	<b>AVG</b>	800	1881	143	0
	<b>TOTAL</b>	24800	58324	4440	0
<b>June</b>	<b>MAX</b>	800	1987	2327	3110
	<b>AVG</b>	667	1764	1115	684
	<b>TOTAL</b>	20000	52913	33440	21201
<b>July</b>	<b>MAX</b>	800	1987	2327	0
	<b>AVG</b>	0	1783	1127	0
	<b>TOTAL</b>	0	55288	34941	0
<b>August</b>	<b>MAX</b>	1006	1907	2616	0
	<b>AVG</b>	270	1761	1506	0
	<b>TOTAL</b>	8365	54594	46692	0
<b>September</b>	<b>MAX</b>	1072	1831	2164	0
	<b>AVG</b>	985	1774	1686	0
	<b>TOTAL</b>	29546	53232	50595	0
<b>October</b>	<b>MAX</b>	1084	2082	2116	0
	<b>AVG</b>	993	1806	1745	0
	<b>TOTAL</b>	30785	55982	54110	0
<b>November</b>	<b>MAX</b>	971	2282	1993	0
	<b>AVG</b>	873	1515	1899	0
	<b>TOTAL</b>	26176	45438	56984	0
<b>December</b>	<b>MAX</b>	943	1874	2653	0
	<b>AVG</b>	393	1730	1206	0
	<b>TOTAL</b>	12196	53628	37397	0
	<b>Annual Max Day</b>	<b>1084</b>	<b>2282</b>	<b>2653</b>	<b>3110</b>
	<b>Annual Avg Day</b>	<b>620</b>	<b>1770</b>	<b>1249</b>	<b>684</b>
	<b>Annual Total</b>	<b>226468</b>	<b>646072</b>	<b>455823</b>	<b>21201</b>

**APPENDIX B**  
**2009 MONTHLY MAXIMUM INSTANTANEOUS FLOW**  
**SUMMARIES**

**Table N - Summary of Instantaneous Well Flows by Month  
(L/s)**

		<b>Emma</b>	<b>Dean Well</b>	<b>Downey Well</b>	<b>Carter Combined</b>
	<i>Max PTTW Rate (L/s)</i>	<b>35.8</b>	<b>26.6</b>	<b>60.6</b>	<b>90.1</b>
<b>January</b>	<b>Maximum</b>	35.5	21.2	49.8	80.8
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	17.8	14.6	48.8	20.3
<b>February</b>	<b>Maximum</b>	34.4	20.8	49.5	80.1
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	20.6	16.4	48.5	0.0
<b>March</b>	<b>Maximum</b>	34.7	20.9	51.2	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	18.3	16.3	48.1	0.0
<b>April</b>	<b>Maximum</b>	34.7	20.5	57.6	60.4
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	16.9	16.1	47.6	11.3
<b>May</b>	<b>Maximum</b>	35.0	20.6	57.0	82.1
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	5.6	15.5	45.9	3.2
<b>June</b>	<b>Maximum</b>	35.1	20.4	49.7	81.8
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	18.2	15.4	45.0	41.4
<b>July</b>	<b>Maximum</b>	34.8	20.5	50.6	76.8
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	16.5	15.1	44.9	39.3
<b>August</b>	<b>Maximum</b>	34.4	20.8	50.2	77.5
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	18.9	14.9	44.3	39.8
<b>September</b>	<b>Maximum</b>	34.0	20.3	46.5	76.5
	<b>Minimum</b>	0.0	0.0	43.5	0.0
	<b>Average</b>	25.1	14.4	44.7	36.8
<b>October</b>	<b>Maximum</b>	32.2	21.7	49.9	42.6
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	30.8	13.8	43.5	25.5
<b>November</b>	<b>Maximum</b>	31.2	20.8	54.0	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	30.2	13.0	44.8	0.0
<b>December</b>	<b>Maximum</b>	33.0	20.0	58.1	33.4
	<b>Minimum</b>	0.0	0.0	0.0	0.0
	<b>Average</b>	22.0	12.8	50.1	16.6

**Table N - Summary of Instantaneous Well Flows by Month  
(L/s) (continued)**

		Calico Well	Burkes Well	Arkell Well 8	Arkell Well 7
	<i>Max PTTW Rate (L/s)</i>	<b>60.6</b>	<b>75.8</b>	<b>228.3</b>	<b>228.3</b>
January	Maximum	46.0	74.0	71.0	72.9
	Minimum	0.0	0.0	0.0	0.0
	Average	8.4	60.8	57.0	47.8
February	Maximum	18.7	72.0	65.0	73.0
	Minimum	0.0	0.0	0.0	0.0
	Average	8.3	61.6	54.0	46.6
March	Maximum	50.0	75.0	66.0	73.3
	Minimum	0.0	0.0	0.0	0.0
	Average	9.6	60.6	43.0	40.4
April	Maximum	22.0	74.0	66.0	73.5
	Minimum	0.0	0.0	0.0	0.0
	Average	8.2	60.6	31.0	26.9
May	Maximum	32.7	75.0	75.0	73.3
	Minimum	0.0	0.0	0.0	0.0
	Average	8.3	57.4	6.0	15.2
June	Maximum	40.9	75.0	75.0	75.0
	Minimum	0.0	0.0	0.0	0.0
	Average	8.2	59.2	19.3	27.1
July	Maximum	42.4	72.0	72.0	70.0
	Minimum	0.0	0.0	0.0	0.0
	Average	8.0	54.4	29.0	15.2
August	Maximum	14.3	75.0	75.0	75.0
	Minimum	0.0	0.0	0.0	0.0
	Average	9.5	60.5	33.7	25.1
September	Maximum	39.0	74.0	72.0	72.3
	Minimum	0.0	0.0	0.0	0.0
	Average	13.6	60.9	38.7	33.4
October	Maximum	20.6	75.0	75.1	70.7
	Minimum	0.0	0.0	0.0	0.0
	Average	5.6	42.0	37.4	31.0
November	Maximum	34.9	73.0	74.0	74.8
	Minimum	0.0	0.0	0.0	0.0
	Average	9.2	14.8	45.4	43.3
December	Maximum	24.5	74.0	75.0	75.3
	Minimum	0.0	0.0	0.0	0.0
	Average	9.0	19.9	57.4	54.3

**Table N - Summary of Instantaneous Well Flows by Month  
(L/s) (continued)**

		Arkell Well 6	Arkell Well 1	Recharge	Water St Well
	<i>Max PTTW Rate (L/s)</i>	<b>228.3</b>	<b>37.9</b>	<b>157.8</b>	<b>39.3</b>
January	Maximum	73.6	15.0	0.0	33.2
	Minimum	0.0	0.0	0.0	0.0
	Average	53.9	9.0	0.0	13.3
February	Maximum	72.4	14.0	0.0	38.8
	Minimum	0.0	0.0	0.0	0.0
	Average	34.3	10.0	0.0	15.4
March	Maximum	72.8	14.0	0.0	37.3
	Minimum	0.0	0.0	0.0	0.0
	Average	29.5	8.0	0.0	14.4
April	Maximum	73.8	14.0	0.0	38.5
	Minimum	0.0	0.0	0.0	0.0
	Average	18.9	1.0	0.0	10.0
May	Maximum	75.0	0.0	0.0	35.5
	Minimum	0.0	0.0	0.0	0.0
	Average	8.1	0.0	0.0	1.7
June	Maximum	75.0	29.0	105.0	39.3
	Minimum	0.0	0.0	0.0	0.0
	Average	11.2	0.5	18.4	13.7
July	Maximum	71.8	14.0	86.0	38.0
	Minimum	0.0	0.0	0.0	0.0
	Average	22.4	3.3	83.4	13.0
August	Maximum	75.2	14.0	92.0	38.0
	Minimum	0.0	0.0	0.0	0.0
	Average	13.8	4.6	72.3	15.1
September	Maximum	72.1	14.0	81.0	33.7
	Minimum	0.0	0.0	0.0	0.0
	Average	22.5	13.5	40.9	19.5
October	Maximum	73.1	14.0	0.0	39.0
	Minimum	0.0	0.0	0.0	0.0
	Average	22.9	8.9	66.9	20.2
November	Maximum	71.8	14.0	82.0	35.4
	Minimum	0.0	0.0	0.0	0.0
	Average	35.9	11.9	34.2	22.2
December	Maximum	72.6	14.0	0.0	33.5
	Minimum	0.0	0.0	0.0	0.0
	Average	49.8	13.5	0.0	12.2

**Table N - Summary of Instantaneous Well Flows by Month  
(L/s) (continued)**

		University Well	Queensdale Well	Park Well 2	Park Well 1
	<b>Max PTTW Rate (L/s)</b>	<b>38.2</b>	<b>60.6</b>		
January	Maximum	33.3	12.9	49.3	43.6
	Minimum	0.0	0.0	0.0	0.0
	Average	21.2	7.4	43.2	19.9
February	Maximum	27.2	12.8	45.5	41.1
	Minimum	0.0	0.0	0.0	0.0
	Average	20.5	7.5	43.1	33.9
March	Maximum	27.3	16.2	45.7	42.3
	Minimum	0.0	0.0	0.0	0.0
	Average	20.4	3.7	39.7	32.4
April	Maximum	27.5	15.9	54.7	54.1
	Minimum	0.0	0.0	0.0	0.0
	Average	20.6	9.5	43.9	33.6
May	Maximum	27.6	15.7	53.6	58.2
	Minimum	0.0	0.0	0.0	0.0
	Average	21.5	10.3	46.1	9.6
June	Maximum	24.1	15.6	55.9	59.5
	Minimum	0.0	0.0	0.0	0.0
	Average	20.7	7.9	48.4	27.4
July	Maximum	27.6	15.8	56.8	60.1
	Minimum	0.0	0.0	0.0	0.0
	Average	20.5	0.0	47.5	21.8
August	Maximum	27.6	17.9	55.1	59.0
	Minimum	0.0	0.0	0.0	0.0
	Average	19.4	3.0	27.9	55.2
September	Maximum	27.4	17.4	52.2	59.5
	Minimum	0.0	0.0	0.0	0.0
	Average	20.4	11.4	31.0	51.6
October	Maximum	27.5	15.8	46.9	50.8
	Minimum	0.0	0.0	0.0	0.0
	Average	20.6	11.4	32.7	47.7
November	Maximum	30.5	15.4	45.9	51.2
	Minimum	0.0	0.0	0.0	0.0
	Average	17.6	10.2	36.4	48.5
December	Maximum	27.9	14.2	46.2	51.5
	Minimum	0.0	0.0	0.0	0.0
	Average	20.2	4.9	39.4	48.8

**Table N - Summary of Instantaneous Well Flows by Month (L/s)**

		<b>Park Wells Combined</b>	<b>Paisley Well</b>	<b>Membro Well</b>	<b>Helmar Well</b>	<b>Clythe Well</b>
	<b>Max PTTW Rate (L/s)</b>	<b>119.2</b>	<b>37.0</b>	<b>70.0</b>	<b>37.9</b>	<b>60.6</b>
<b>January</b>	<b>Maximum</b>	91.0	14.1	51.7	22.2	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	63.1	7.6	33.6	0.6	0.0
<b>February</b>	<b>Maximum</b>	86.5	13.8	53.8	25.8	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	77.0	13.8	39.1	0.3	0.0
<b>March</b>	<b>Maximum</b>	87.7	13.8	53.5	25.8	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	72.0	13.7	38.7	0.7	0.0
<b>April</b>	<b>Maximum</b>	106.9	13.8	57.1	25.4	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	77.6	13.7	25.9	8.0	0.0
<b>May</b>	<b>Maximum</b>	108.5	13.8	54.1	26.4	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	55.7	13.8	24.1	5.1	0.0
<b>June</b>	<b>Maximum</b>	114.7	14.4	53.7	14.9	36.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	75.8	6.0	31.0	11.2	9.3
<b>July</b>	<b>Maximum</b>	115.5	14.8	50.6	14.4	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	69.3	13.0	35.6	10.0	0.0
<b>August</b>	<b>Maximum</b>	113.3	13.9	50.9	13.6	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	83.1	13.4	32.9	7.7	0.0
<b>September</b>	<b>Maximum</b>	111.3	13.9	47.8	13.5	0.0
	<b>Minimum</b>	0.0	13.1	0.0	0.0	0.0
	<b>Average</b>	82.6	13.4	38.3	9.5	0.0
<b>October</b>	<b>Maximum</b>	97.4	13.6	47.6	20.5	0.0
	<b>Minimum</b>	0.0	12.9	0.0	0.0	0.0
	<b>Average</b>	80.4	13.5	37.7	7.9	0.0
<b>November</b>	<b>Maximum</b>	96.9	13.5	49.3	12.3	0.0
	<b>Minimum</b>	0.0	0.0	0.0	0.0	0.0
	<b>Average</b>	84.9	13.0	38.1	8.4	0.0
<b>December</b>	<b>Maximum</b>	96.3	13.5	49.0	10.9	0.0
	<b>Minimum</b>	0.0	13.2	0.0	0.0	0.0
	<b>Average</b>	88.2	13.4	38.8	8.1	0.0