



**Township of Huron-Kinloss
Lucknow Drinking Water System**



**Water Quality Summary Report
2017**



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2017 Water Quality Summary Report

This is a summary of regulatory compliance for the Lucknow Drinking Water System in 2017. A complete summary of the flows, sampling results, chemical use, and significant activities, was submitted on February 27, 2018 in the Annual Report.

OVERVIEW AND BACKGROUND:

Safe Drinking Water Act

Following the Walkerton tragedy in 2000, the Ontario Government developed a new, comprehensive legislative paradigm based on a source-to-tap, multi-barrier approach to the protection of drinking water. The *Safe Drinking Water Act (SDWA), 2002*, and its Regulations, contain requirements for Municipalities that provide potable water to their residents.

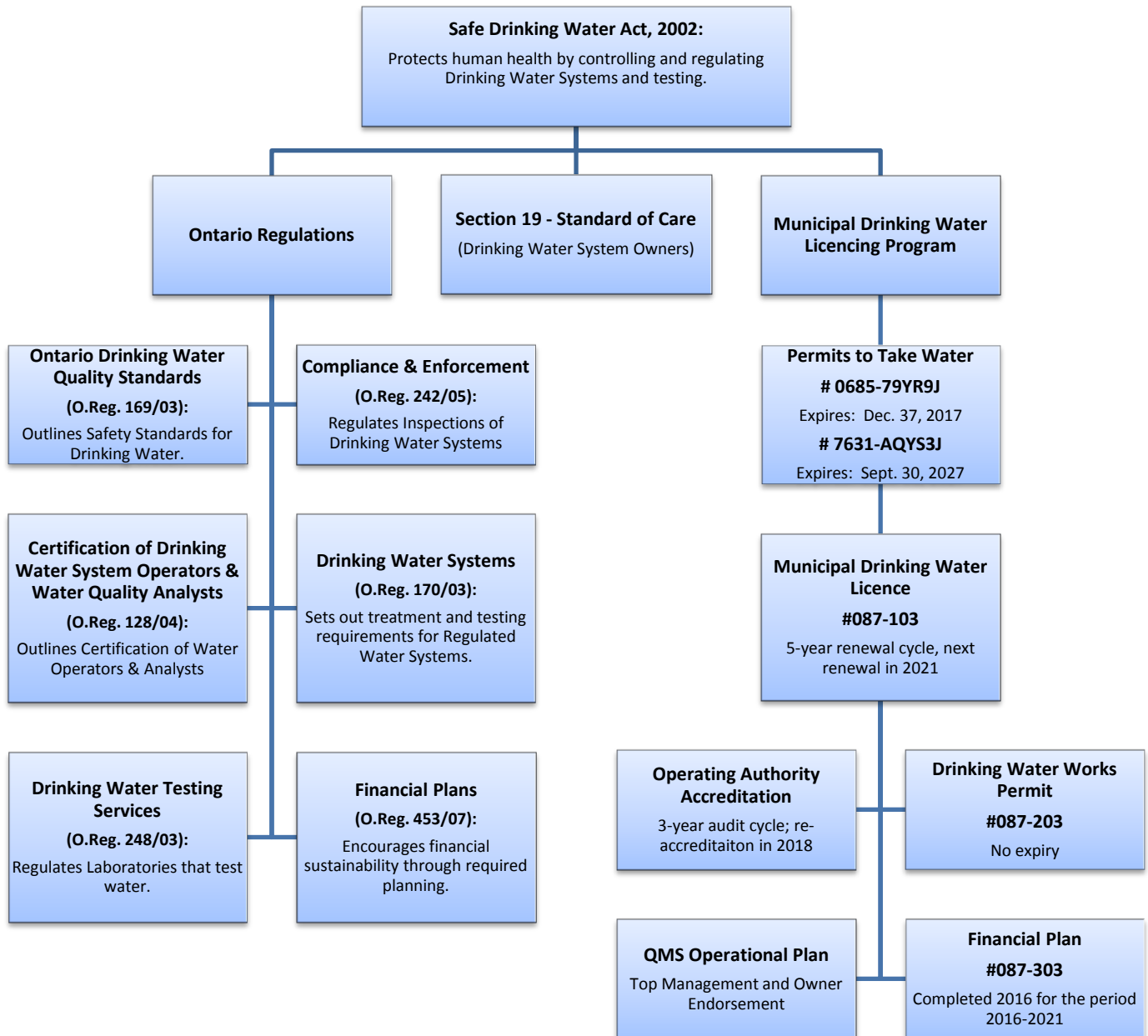
Under Section 19 (Standard of Care of the *SDWA*, owners of a Drinking Water System are required to:

- (a) exercise the level of care, diligence and skill in respect of a Municipal Drinking Water System that a reasonably prudent person would be expected to exercise in a similar situation; and
 - (b) act honestly, competently and with integrity, with a view to ensuring the protection and safety of the users of the Municipal Drinking Water System.
- 2002, c. 32, s. 19(1).

The following chart outlines key aspects of the *SDWA* that relate to Lucknow's Drinking Water System:



Legislative Framework for the Lucknow Drinking Water System





REPORTING REQUIREMENTS:

This report intends to provide relevant information to help the Township of Huron-Kinloss its Council, as owners of the Lucknow Drinking Water System, meet this Standard of Care. Its contents are organized as follows, according to specific reporting requirements under the *SDWA*:

1. **Summary Report:** Schedule 22 of Ontario's *Drinking Water Systems Regulation* (O. Reg. 170/03) requires that a summary report be prepared for the preceding calendar year, and submitted to members of Council to disclose compliance status and provide pertinent water quality data.
2. **Annual Report (Appendix #1):** Section 11 of O. Reg. 170/03 requires that an annual report be prepared for the preceding calendar year, and submitted to members of Council and the Township of Huron-Kinloss. This report summarizes water quality monitoring, corrective actions, and major expenses, and is made available to the public on the Township of Huron-Kinloss website and at the Township office.
3. **MOECC Inspection Report (Appendix #2):** In 2006, the Ministry of the Environment and Climate Change (MOECC) introduced a comprehensive inspection program for Municipal Residential Drinking Water Systems. The objectives of this program are to determine compliance with the *SDWA* and associated regulations; to encourage the continuous improvement of the drinking water system; and to establish a process to measure these improvements.
4. **Municipal Drinking Water Management Review (Appendix #3):** The *SDWA*, through the Municipal Drinking Water Licensing program, requires that the Township maintain an accredited Quality Management System (QMS) for its drinking water system. This review communicates to Council key information related to the QMS and the Municipal Drinking Water Licensing program.
5. **QMS "Operational Plan" (Appendix #4):** The *SDWA*, through the Municipal Drinking Water Licensing program, requires that a Municipal Drinking Water System Owner (Council) endorse the most current version of the QMS Operational Plan. This document, once endorsed, is posted on the Township of Huron-Kinloss website and is available at the Operations Centre.

1. SUMMARY REPORT

1.1 Submission to the Township of Huron-Kinloss

Schedule 22 of Ontario Regulation 170/03 requires, for Large Municipal Residential Systems, that a Summary Report be prepared and submitted to the Township of Huron-Kinloss, for distribution to Council by March 31, 2018 for the period from January 1 to December 31, 2017.



1.2 Statement of Compliance

Requirements for owning and operating the Lucknow Drinking Water System are contained within the SDWA, its applicable regulations, and its approval instruments.

- The MOECC “Drinking Water Ontario” web portal provides the most current version of the Act and its regulations: www.ene.gov.on.ca/environment/dwo
- The Township of Huron-Kinloss is approved by the MOECC to operate a Class 2 Distribution and Supply System through its Municipal Drinking Water Licence (MDWL) #087-103, and to alter the system through its Drinking Water Works Permit (DWWP) #087-203.

Compliance with these requirements is evaluated through annual Ministry Inspections. The Lucknow 2016/2017 Inspection Report (Appendix #3) contains **one incident of non-compliance** and a **rating of 100.00%**. There have been no Orders issued by the MOECC under the SDWA or Ontario Regulation 170/03 for the period of January 1, 2017 to December 31, 2017.

1.3 Summary of Flow Rates

Under Schedule 22-2(3) of O. Reg. 170/03, the Summary Report must include a summary of flow rates for the purpose of enabling the system owner to assess the capability of the system to meet existing and planned uses.

Table 1 is a summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average.

Permit To Take Water exceedances are itemized and reported in Table 2. PTTW # 0685-79YR9J has a maximum runtime of 18 hours/day. During this event, no other parameters were exceeded. The new PTTW # 7631-AQYS3J, which replaces # 0685-79YR9J, does not have a maximum runtime parameter.

Table 1: 2017 Summary of Flows for Lucknow

Lucknow # 4:

| Month | Raw Flow Daily Max (L/s) | Raw Flow Monthly Avg (L/s) | Raw Volume Monthly Total (m ³) | Raw Volume Daily Max (m ³) | Raw Volume Monthly Avg (m ³) | Capacity Monthly Max (%) |
|---------------------|--------------------------|----------------------------|--|--|--|--------------------------|
| January | 9.21 | 8.76 | 3,708.22 | 605.54 | 119.62 | 64.76 |
| February | 9.14 | 8.24 | 2,104.47 | 327.04 | 75.16 | 34.98 |
| March | 9.14 | 8.65 | 934.06 | 170.46 | 30.13 | 18.23 |
| April | 13.85 | 8.32 | 1,530.43 | 271.47 | 51.01 | 29.03 |
| May | 9.21 | 8.33 | 1,677.25 | 325.78 | 54.10 | 34.84 |
| June | 9.72 | 8.54 | 2,570.75 | 374.23 | 85.69 | 40.02 |
| July | 9.27 | 8.69 | 1,711.50 | 284.13 | 55.21 | 30.39 |
| August | 9.27 | 8.22 | 2,336.53 | 312.15 | 75.37 | 33.39 |
| September | 13.44 | 8.61 | 2,344.88 | 392.93 | 78.16 | 42.02 |
| October | 13.62 | 8.27 | 1,358.07 | 212.97 | 43.81 | 22.78 |
| November | 9.22 | 8.20 | 2,218.47 | 275.05 | 73.95 | 29.42 |
| December | 9.19 | 8.84 | 2,394.91 | 333.10 | 77.26 | 35.63 |
| PTTW Max | 14.42 | 14.42 | 28,439.58 | 935.00 | --- | --- |
| Annual Max | 13.85 | --- | 3,708.22 | 605.54 | --- | 64.76 |
| Annual Avg | --- | 8.47 | 2,074.13 | --- | 68.29 | 15.41 |
| Annual Total | --- | --- | 24,889.54 | --- | --- | --- |



Lucknow # 5:

| Month | Raw Flow Daily Max (L/s) | Raw Flow Monthly Avg (L/s) | Raw Volume Monthly Total (m ³) | Raw Volume Daily Max (m ³) | Raw Volume Monthly Avg (m ³) | Capacity Monthly Max (%) |
|-----------------|--------------------------|----------------------------|--|--|--|--------------------------|
| January | 32.51 | 24.58 | 15,241.59 | 669.01 | 491.66 | 44.60 |
| February | 32.37 | 25.25 | 14,255.11 | 624.79 | 509.11 | 41.65 |
| March | 32.51 | 25.60 | 17,476.48 | 687.90 | 563.76 | 45.86 |
| April | 32.64 | 25.42 | 13,357.04 | 754.46 | 445.23 | 50.30 |
| May | 32.71 | 29.81 | 12,727.16 | 625.48 | 410.55 | 41.70 |
| June | 36.45 | 24.79 | 14,914.43 | 703.22 | 497.15 | 46.88 |
| July | 30.08 | 24.34 | 15,657.05 | 666.16 | 505.07 | 44.41 |
| August | 29.85 | 23.70 | 13,738.09 | 632.80 | 443.16 | 42.19 |
| September | 29.91 | 23.89 | 13,639.46 | 752.50 | 454.65 | 50.17 |
| October | 29.94 | 23.95 | 13,618.59 | 552.12 | 439.31 | 36.81 |
| November | 30.04 | 24.11 | 13,783.00 | 640.90 | 459.43 | 42.73 |
| December | 30.35 | 24.79 | 19,003.02 | 816.96 | 613.00 | 54.46 |
| PTTW Max | 37.90 | 37.90 | 45,625.00 | 1,500.00 | -- | -- |
| Annual Max | 36.45 | -- | 19,003.02 | 816.96 | -- | 54.46 |
| Annual Avg | -- | 25.02 | 14,784.25 | -- | 486.01 | 36.95 |
| Annual Total | -- | -- | 177,411.02 | -- | -- | -- |

Lucknow # 4 and # 5 Combined:

| Month | Treated Volume Monthly Total (m ³) | Treated Volume Daily Max (m ³) | Treated Volume Monthly Avg (m ³) | Capacity Daily Max (%) |
|-----------------|--|--|--|------------------------|
| January | 18,949.81 | 682.46 | 611.28 | 45.50 |
| February | 16,359.58 | 624.79 | 584.27 | 41.65 |
| March | 18,410.54 | 687.90 | 593.89 | 45.86 |
| April | 14,887.47 | 819.25 | 496.25 | 54.62 |
| May | 14,404.41 | 625.48 | 464.66 | 41.70 |
| June | 17,485.18 | 851.31 | 582.84 | 56.75 |
| July | 17,368.55 | 673.79 | 560.28 | 44.92 |
| August | 16,074.62 | 675.40 | 518.54 | 45.03 |
| September | 15,984.34 | 794.75 | 532.81 | 52.98 |
| October | 14,976.66 | 563.14 | 483.12 | 37.54 |
| November | 16,001.47 | 640.90 | 533.38 | 42.73 |
| December | 21,397.93 | 920.51 | 690.26 | 54.70 |
| PTTW Max | 45,625.00 | 1,500.00 | -- | -- |
| Annual Max | 21,397.93 | 851.31 | -- | 56.75 |
| Annual Avg | 16,858.38 | -- | 554.30 | -- |
| Annual Total | 202,300.56 | -- | -- | -- |



Table 2: 2017 Summary of Exceedances for Lucknow

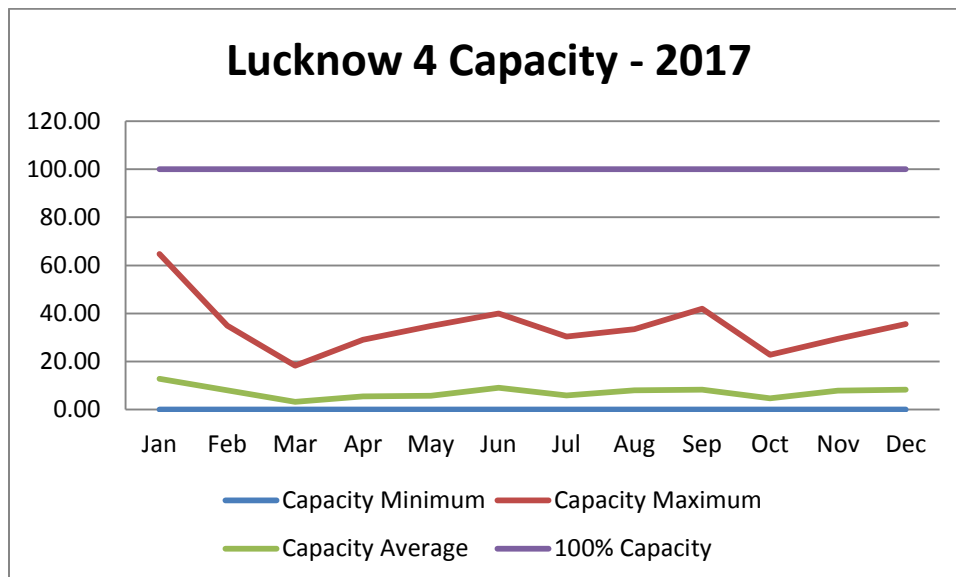
| Date | Flow Peak L/s | Begin Time | End Time | Duration Minutes | Total Volume m ³ | Runtime | Reason | Retention Time (Minutes) | CT4 Req'd mg/L | Actual min mg/L |
|--------|------------------|---------------|-------------|---------------------|--------------------------------|---------|----------------|-----------------------------|-------------------|--------------------|
| Jan 19 | 9.10 | | | | 605.54 | 18.98 | Operator error | | | 1.39 |

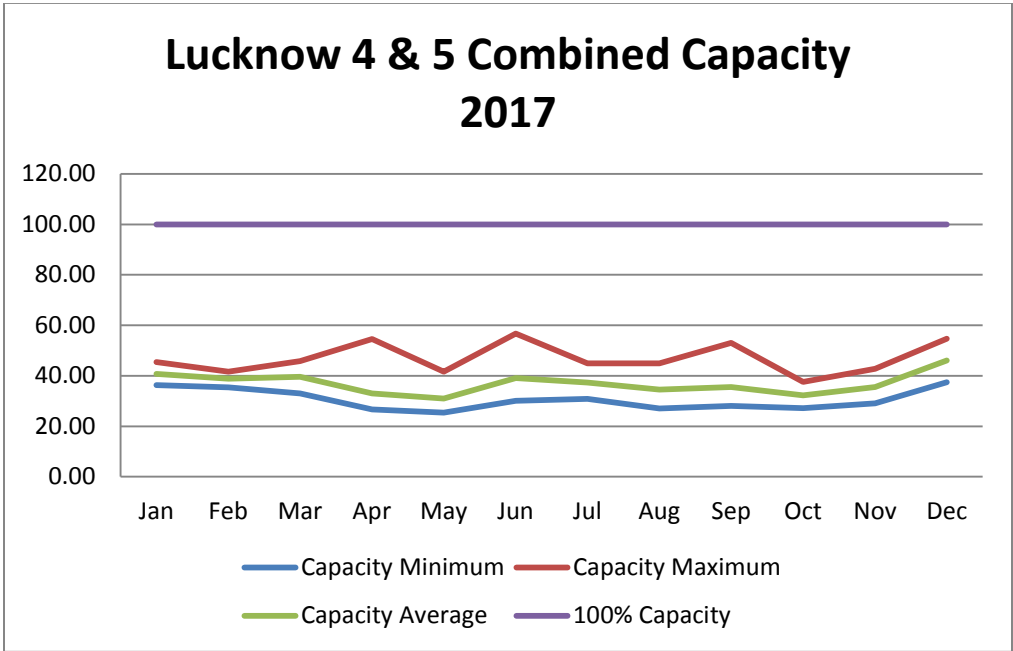
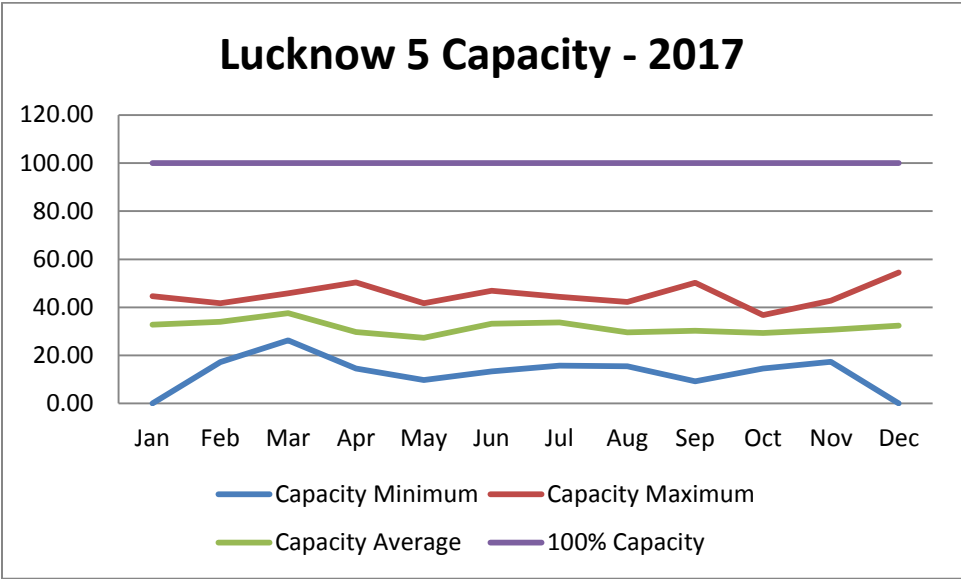
1.4 Comparison of Flow Rates vs. Rated Capacity

Under Schedule 22-2(3) of O. Reg. 170/03, the Summary Report must also include a comparison of the summary referred to in paragraph 1 to the rated capacity and flow rates approved in the system’s approval, drinking water works permit or municipal drinking water licence.

Table 3 is a summary of the quantities and flow rates of the water supplied during the period covered by the report, including monthly average, from the well house. The total system capacity is shown in the last graph. It represents the percentage capacity of sum of all the water produced in relation to the total system volume permitted.

Table 3: 2017 Flow Summary Compared to Rated Capacity





| | |
|--|---------------------------|
| Annual Lucknow Rated Capacity, PTTW (m³) | 547,500.00 m ³ |
| Annual Lucknow Total Volume, Actual (m³) | 202,300.56 m ³ |
| Annual Lucknow Total Capacity % | 36.95 % |



1.4 Responsibility for Water Supply, Treatment and Storage

Provincial Legislation sets out the responsibility for the Lucknow Drinking Water Supply. Under the *Municipal Act, 2001*, the Township of Huron-Kinloss is responsible for the treatment and storage of water for the Village of Lucknow. Veolia Water has been retained by the Township of Huron-Kinloss as the Operating Authority for the Lucknow Drinking Water System.

1.5 System Description

The Lucknow water system is characterized as a “secure ground water” system and is categorized as a Class 2 Distribution and Supply Large Municipal Residential drinking water system as per O. Reg. 170/03. The system consists of two sub-systems and its equipment has a daily maximum capacity to deliver 1,500 cubic metres of potable water to the Village of Lucknow and the subsystem supplying the Lucknow South Subdivision in the Township of Ashfield-Colborne- Wawanosh.

The water sources are two secure deep bed rock wells. One is located at the Lucknow # 4 well house, and the other is the Lucknow # 5 well house. The equipment in each well house is SCADA controlled from a central computer located in Ripley at the Township Office. Each well house is equipped with a well pump, chlorinators, a chlorine contact structure and on-line monitoring. The chlorine contact structure at the Lucknow # 4 well house is 90m x 437mm ID = 13,499 L. The chlorine contact structure at the Lucknow # 5 well house is 230m x 437mm ID = 34,497 L.

The well houses were constructed in the 1957 and 1967. They were upgraded in 2006 with chlorine contact facilities being added. Improvements to the SCADA system were begun in 2007. Eramosa began in August of 2014 to replace the obsolete SCADA. Both well houses are equipped with receptacles and manual transfer switches for a portable generator.

Lucknow Well # 5 was inspected with a video camera in 2009. A new submersible well pump was installed at that time. Lucknow Well # 4 is due for a down the hole inspection in 2018.

The attached distribution system is a combination of PVC, ductile iron and cast iron water mains. In addition to the water mains, associated valves, and hydrants, the distribution system includes a standpipe at the end of Ross St., which contains an operating volume of 969.55 m³. This structure also maintains distribution system pressure. The well pumps cycle on and off to maintain the operating level of this structure. Due to the age and condition of the standpipe, engineering plans are underway for the construction of a new water storage structure, and the project is being prepared for tender by the Township.

The raw water from each well is disinfected using sodium hypochlorite (12%) and serves primarily as a measure to prevent microbiological growth within the raw water pipeline, standpipe, and distribution system. The Lucknow Drinking Water System achieves a minimum of **2-log removal or inactivation of viruses** as outlined in the MOECC *Procedure for Disinfection of Drinking Water in Ontario* with the respective chlorine contact water mains.

1.6 Licences and Permits

The Lucknow drinking water system has the following licences and permits:

| | | | |
|----------------------|---------------|----------------------------|-----------------------------|
| Lucknow PTTW: | # 0685-79YR9J | Issued: December 21, 2007 | Expires: December 17, 2017 |
| | # 7631-AQUS3J | Issued: September 29, 2017 | Expires: September 30, 2027 |
| MDWL: | # 087-103 | Issued: May 20, 2016 | Expires: May 19, 2021 |
| DWWP: | # 087-203 | Issued: May 20, 2016 | Expires: No expiry |



1.7 System Infrastructure

The Lucknow Drinking Water System has a distribution network of 13.5 km, with approximately 62 fire hydrants, 4 blow-offs, and 665 customer services. The distribution system is a combination of PVC, ductile iron and cast iron water mains, with sizes varying between 2-inch and 12-inch diameter.

Semi-annual flushing is performed in Spring and Fall, along with annual valve turning. Periodic flushing of dead-ends occurs as necessary.

1.8 Water Sampling and Testing

The purpose of sampling and testing is to confirm that water is safe for human consumption and to provide a comprehensive track record.

Requirement:

O. Reg. 170/03 stipulates the minimum number and frequency of sampling for Lucknow’s distribution system. Based on an estimated potential population of 1,729 residents, Lucknow must meet the following annual sampling requirements:

| Parameter | Description | Required # of Samples | Requirement Source |
|---|--|---------------------------------------|---|
| Chlorine Residual (grab) | For monitoring amount of residual in system, and confirming of water quality following maintenance | 365 | O. Reg. 170/03, Sch. 7, S. 7-2 |
| E. Coli Total Coliform Heterotrophic Plate Count (HPC) | For testing presence of microbiological activity | 108 | O. Reg. 170/03, Sch. 10 |
| Trihalomethanes (THMs) | For testing presence of disinfection by-products | 4 | O. Reg. 170/03, Sch. 13, S. 13-6 |
| Lead (Pb) | For testing presence of lead in the distribution system only – not private side | * reduced sampling in effect for 2017 | O. Reg. 170/03, Sch. 15; MDWL # 087-102, Sch. D |
| Haloacetic Acids (HAAs) | For monitoring the formation of disinfection by-products (DBPs) | 4 | O. Reg. 170/03, Sch. 13, S. 13-6.1 |

Sampling Frequency and Location:

Currently, operators collect water samples for microbiological analysis on a weekly basis, and perform grab chlorine residuals on a daily basis. Operators may use Township buildings, businesses, and residential homes to collect samples, depending on access to sample taps.

In 2017, staff collected 471 distribution chlorine residuals and 157 microbiological samples. Chlorine residuals are measured with each distribution sample collected, as well as on a daily basis. Microbiological samples are sent primarily to E3 Laboratories in Niagara-on-the-Lake, but on occasion they are sent to SGS Environmental in London. Staff also collected 4 pH and alkalinity samples, and 4 THMs through this reporting period.

1.9 Communications When Adverse Water Samples Are Identified

Requirement – Laboratory:

A water sample that does not meet Provincial water quality standards is considered “adverse”. When adverse water quality is detected, the accredited laboratory conducting the testing will immediately notify the Operating Authority, the Spills Action Centre (SAC), and the Grey Bruce Medical Officer of Health, and occasionally the Huron County Medical Officer of Health (as necessary). This notification is made by telephone through live communication to a person in authority. In addition to the phone calls, a fax is sent to the three agencies to verify the live communication made earlier.



Requirement – Drinking Water System Owner/Operating Authority:

The SDWA also requires the drinking water system Owner/Operating Authority to immediately notify the MOECC, the Owner, and the Grey Bruce Medical Officer of Health that the laboratory notice has been received and that “corrective actions” are being initiated. The method of contact is by telephone to a person of authority. The Operating Authority also faxes both agencies first to verify the previous live communication, and to confirm that corrective actions have been completed and the issue resolved.

This reporting system provides assurance that the water works owner is complying with the applicable regulations and that appropriate corrective actions are being taken and are being reported.

2.0 ANNUAL REPORT

The Annual Report is appended to this report as *Appendix #1*. Section 11 of Ontario Regulation 170/03 requires that an Annual Report be prepared by February 28th each year for the preceding calendar year. As well, the Annual Report must be made available to the public, free of charge. To meet this requirement, the Lucknow 2017 Annual Report will be posted on the Township website and shall be available at the Township Office. The Annual Report must include:

- A brief description of the water system.
- A summary of chemical usage for treatment.
- A summary of expenses incurred to make improvements to the water system.
- A summary of water quality testing results for microbiological, inorganic chemical and organic chemical parameters.
- A summary of adverse water quality reports.
- A description of how the Annual Report has been distributed and where the Annual Report and Summary Report required under O. Reg. 170/03 Schedule 22, will be located in order to be accessible to the public.

3.0 MOECC INSPECTION REPORT

There was an MOECC Drinking Water Inspection performed in April 2017. At this time, MOECC staff conducted an ‘unannounced focused inspection’ of the Lucknow Drinking Water System. The inspection included a review of operating manuals, logbooks, staff certification and training, and water quality monitoring. It also includes an audit of the SCADA alarm history, data collection, summary and incident reports, and the operator log-in history.

The entire process concludes with an Inspection Report that includes required actions, recommended actions, and a final inspection rating. A low inspection rating does not necessarily mean that the drinking water provided is unsafe; however, it does indicate the degree to which there is room for improvement in meeting the Provincial regulatory requirements. These findings are used as a tool to track progress towards the Chief Drinking Water Inspector’s goal of achieving 100% compliance with the regulatory framework on a Province wide basis.

The Operating Authority achieved a rating of 100.00% on the 2017 Lucknow Inspection Report – an improvement from the previous 2016 Lucknow Inspection Report (93.48%).

Precautionary Boil Water Notices

There were no Precautionary Boil Water Notices issued by the Operating Authority in 2017 on the Lucknow Drinking Water System.

Boil Water Advisory

There were no Boil Water Advisories issued by the Grey Bruce MOH on the Lucknow Drinking Water System in 2017.



Compliance

There were three adverse water quality incident reports (AWQI) filed with the MOECC and the Grey Bruce Health Unit in 2017.

- AWQI # 133325, June 10, 2017: Chlorine pump failure, low chlorine
- AWQI # 135642, August 18, 2017: Fluoride exceedance
- AWQI # 136218, August 31, 2017: 1 Total Coliform at Lucknow # 4 treated water

Non-Compliances

- SCADA data gaps

Chemical Exceedances

- **Fluoride**

O. Reg. 169/03 (the Ontario Drinking Water Standard) has a MAC (maximum allowable concentration) of 1.5 mg/L for fluoride. The water from Lucknow is groundwater that has naturally occurring levels that exceed 1.5 mg/L. A report is filed with the Grey Bruce Health unit regarding this exceedance. As required by O. Reg. 170/03 schedule 13, section 13-9 an AWQI (adverse water quality indicator) report is filed with the MOECC and the MOH every 60 months: this was submitted August 18, 2017, and resubmission will be required in 2022. The results from 2017 were as follows:

| | |
|----------------------------|-----------------------------|
| Lucknow # 4 Treated Water: | 1.75 mg/L – August 15, 2017 |
| | 1.72 mg/L – August 21, 2017 |
| Lucknow # 5 Treated Water: | 1.78 mg/L – August 15, 2017 |
| | 1.74 mg/L – August 21, 2017 |

- **Sodium**

O. Reg. 169/03 has an MAC of 20.0 mg/L for sodium. The water from Lucknow is groundwater that has naturally occurring elevated levels of sodium. The results from the Lucknow treated water sources exceed the half-MAC. As required by O. Reg. 170/03 schedule 13, section 13-8 the water is sampled every 60 months for sodium. This was reported in June 21, 2016. It will need to be re-submitted in June 2021. The results from June 2016 were as follows:

| | |
|----------------------------|-----------|
| Lucknow # 4 Treated Water: | 10.8 mg/L |
| Lucknow # 5 Treated Water: | 12.8 mg/L |

4.0 MUNICIPAL DRINKING WATER MANAGEMENT REVIEW:

The Township of Huron-Kinloss received the first Municipal Drinking Water License and Drinking Water Works Permit for the Lucknow Drinking Water System on August 4, 2011. According to the five-year renewal cycle, these documents were due for renewal prior to August 4, 2016. Renewal submissions were made early in 2016, and these documents were renewed. The MDWL will now expire in May 2021.



Under the Licensing program, the Township of Huron-Kinloss is required to maintain a drinking water Quality Management System (QMS). *Appendix 3* contains information and updates related to the QMS that, in accordance with the Provincial Drinking Water Quality Management Standard (DWQMS), must be communicated to Council on an annual basis.

Note: For QMS Roles and Responsibilities, see Organizational Chart and Roles & Responsibilities Table in Appendix 4 – Operational Plan.

- a. QMS Management Review Outcomes – includes action items from the most recent Management Review meeting
- b. Infrastructure Review Outcomes and Infrastructure Programs Summary – includes a summary of the infrastructure review process and of infrastructure repair, rehabilitation, and renewal programming.

Infrastructure Assessment

Regular contact is maintained with the Huron-Kinloss representative and also a written monthly report is submitted. The JobsPlus program is continually updated with preventative and corrective maintenance issues. A complete summary can be forwarded to the client upon their request. Through regular communication between the operating authority and the client, capital items are discussed. A list of capital items and concerns was forwarded to the Huron-Kinloss representative on October 31, 2017.

The annual Management Review was conducted by the operating authority on May 25, 2017, as per the DWQMS requirement in Element 14. These regular discussions between the client and the operating authority for this water system are continued throughout the year by emails, phone calls, monthly reports, and meetings as per the requirements of Element 15 of the DWQMS.

The S1 Surveillance Audit was conducted by SAI on June 30, 2016. The 36-month Risk Assessment was completed October 20, 2016 and the Internal Audit was completed on December 5-6, 2017. The staff was involved with an Emergency Response exercise on December 20, 2017, which involved a chemical spill near a wellhead.

5.0 QMS OPERATIONAL PLAN

The Township of Huron-Kinloss must document its QMS in an Operational Plan, which must be endorsed by QMS Top Management and Huron-Kinloss Council, and made available to the public. The Operational Plan was reviewed in 2017 as part of the Risk Assessment. *Appendix 4* contains the Lucknow Drinking Water System QMS Operational Plan.

Attachments:

- Appendix 1 – 2017 Annual Report
- Appendix 2 – 2017 MOECC Inspection Reports
- Appendix 3 – QMS Management Review
- Appendix 4 – QMS Operational Plan

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