

ANNUAL SUMMARY REPORT 2004

KINGSTON CENTRAL WATER TREATMENT PLANT

WATERWORKS NUMBER: 220001860

Reporting Period

January 1, 2004 – December 31, 2004

Submitted by:
Jim Keech, P.Eng
President & CEO



ANNUAL SUMMARY REPORT 2004

KINGSTON CENTRAL WATER TREATMENT PLANT WATERWORKS NUMBER: 220001860

This report has been prepared as required under Ontario Reg. 170/03 of the Safe Drinking Water Act to acknowledge compliance with the terms and conditions of the Certificate of Approval issued for the Central Water Treatment Plant, to comment on any incidents of non-compliance during the reporting period, to summarize the quantities of the water supplied and to compare those quantities to the rated capacity and flow rates as set out in the system's permit and approvals in force during the reporting period.

This report is specific to the Kingston Central Water Treatment Plant located at 302 King St. West, and its associated distribution system which serves Kingston's municipal water customers in the areas east of Little Cataraqui Creek, south of Hwy #401, Hwy#2 east to Milton subdivision, and Hwy #15 north to St. Lawrence Business Park. Utilities Kingston operates these facilities for the City of Kingston.

Non-Compliance with Terms and Conditions of the Certificate of Approval (COA)

There were two non-compliance events during this reporting period.

On Feb.23/04 failure of a disinfectant pump resulted in a failure to meet condition 1.4 of the Certificate of Approval for this treatment plant, specifically that a minimum free chlorine residual of 1.4 mg/l be maintained in treated water when the water temperature is $<5^{\circ}\text{C}$. One hundred percent of the required contact time (a measure of disinfection effectiveness) required for the treatment plant was maintained during this time. Due to the pump malfunction, the free chlorine residual in treated water fell below 1.40 mg/l from 05:46 to 06:42 with a minimum residual of 1.07 mg/l. Standby equipment was put into operation to restore disinfection, and chlorine residuals returned to greater than 1.40 mg/l. The malfunctioned pump was repaired and returned to service.

On June 14/04 the post filter free chlorine residual dropped to 0.98 mg/ from 13:40 until 14:07 which resulted in a failure to meet condition 1.4 of the Certificate of Approval for this treatment plant, specifically that a minimum free chlorine residual of 1.1 mg/l be maintained in treated water when the water temperature is $5\text{-}10^{\circ}\text{C}$. One hundred percent of the required contact time (a measure of disinfection effectiveness) required for the treatment plant was maintained during this time. A plugged diffuser was found to cause the disinfectant feed

problem. The diffuser was removed and repaired. The chlorine diffuser system has since undergone upgrades to prevent any further problems.

Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Environment.

Compliance with the Terms and Conditions of the COA

The Treatment Group of Utilities Kingston, for the City of Kingston, operates and maintains the Kingston Central Water Treatment Plant (WTP) and complies with the terms and conditions of the Certificate of Approval (COA) issued for the WTP. The Underground Infrastructure Department and the Treatment Group of Utilities Kingston operate and maintain the associated distribution system and storage and pumping facilities. Staffing is maintained at levels to ensure adequate numbers of trained and licensed personnel are available for proper operations during emergency or upset conditions, vacation/sick relief, or to deal with equipment breakdown.

Contingency plans and operations manuals are established and are located in the appropriate facilities and available to appropriate staff. Operations manuals include information necessary for the day to day operations and maintenance of the WTP and Distribution system as well as information that may not be regularly used but that might be required to be accessed quickly for various purposes. Contingency plans include information that may be required for proper operation of the WTP or Distribution system during emergency or upset conditions, and contain items such as emergency plans and contact lists, alternate materials supply sources and notification lists.

The operations strategy of Utilities Kingston includes ensuring that permits and approvals are in place, that efficient maintenance and operations ensures the quality of water supplied to its customers meets or exceeds the minimum requirements as set out in the Safe Drinking Water act, and that permissible flow rates are not exceeded. The City of Kingston, as a means of source water protection, considers the impact of decisions made within its authority on the drinking water supply source for the WTP.

Flow measuring devices for measuring the amount of water taken from Lake Ontario, and the amount of water supplied to the distribution system are calibrated annually by a third party. Accuracy in these measurements ensures that treatment chemicals are precisely applied and that flows do not exceed the capacity at which the WTP is designed to be effective. These flows are recorded to provide current and historical information which is used for operational decision making, and to allow both the public and the Ministry of the Environment (Ministry) the ability to review WTP operations.

Water quality analyzers that monitor parameters such as chlorine residual and turbidity of critical process streams and of the water directed to the distribution system are alarm

equipped, and are maintained in accordance with the manufacturer's recommendations as well as the conditions of the COA.

Water sampling is conducted in exceedance to the minimum requirements of schedule 13 of Ontario Reg. 170/03 of the Safe Drinking water Act, and includes additional sampling as well as sampling recommended in the first Engineers Report for the WTP. Raw water sampling is conducted to give operational staff information required to determine the level of treatment required to make the water potable. In-plant process stream samples provide monitoring of treatment processes. Treated and distribution system sampling provides information regarding the quality of water delivered to customers. All of these samples are analyzed by either licensed staff or by laboratories accredited by the Standards Council of Canada through the Canadian Association for Environmental Analytical Laboratories.

All sampling information, annual reports, and all other documentation required by the COA and regulations are available for public viewing at the WTP during normal business hours. Annual Reports are also available on the Utilities Kingston website as well as at the Utilities Kingston and City of Kingston offices. Residents of the City of Kingston are encouraged to review this information, the availability of which is advertised through various local media.

Notifications of Adverse Water Quality Results

Under Ontario Reg. 170/03, notifications were required for any instances where a sample result indicated that a parameter used to measure water quality exceeded a Maximum Acceptable Concentration (MAC). Once a notification is received from a laboratory or an observation of any other indicator of adverse water quality is made by operations personnel, corrective action as dictated by the regulations is initiated in an effort to confirm the initial result. If confirmed, further action may be recommended by the Medical Officer of Health. If not confirmed sampling will typically return to the normal schedule, or depending on the parameter, Utilities Kingston may choose to increase the sampling frequency to more closely monitor the parameter for a period of time.

The details of any events requiring notifications are listed below.

Notification of an indicator of adverse water quality was received from Caduceon Environmental Laboratories regarding a sample collected on Nov.15/04, for a positive P/A test for total coliform bacteria. Free chlorine residual tested at the time the sample was collected was 1.46 mg/l. Notifications were made to the Spills Action Center and to the Environmental Health Division of the local Ministry of Health. Re-sampling of the same location, an upstream location and a downstream location were taken on two consecutive days and sent to the lab for analysis. With the high free chlorine residual present in the original sample and the subsequent re-samples not indicating any adverse conditions, a contaminated sample bottle or lab accident is suspected.

Summary of the Quantity of Water Supplied During the Reporting Period

Listed in the tables following this report are the treated water flows for the Central Water Treatment Plant for the year 2004. The serviced population for this WTP is approximately 80,000.

With the annual average daily use at 57,017 cubic meters per day, per capita use at 713 litres per day in the distribution system served by this plant is above the typical Canadian average of 400 – 500 litres per day. The city has imposed limitations or restrictions on water use when necessary. While the number of high-use industrial customers has not risen significantly in the recent past few years, industrial/commercial use is still believed to partly contribute to the higher than expected flows. System losses through leakage, mainly due to the age of the distribution system infrastructure, also account for a significant portion of the 'unaccounted for' water. Leak detection surveys are typically undertaken on a bi-annual basis or when system losses become noticeably high.

Summary of Flow Rate Exceedances

There were no instances during this reporting period where flows exceeded the maximum allowable flow rate of 118,000 m³/d. Listed in the tables following this report are the raw water flows (water taken from Lake Ontario) for the Central Water Treatment Plant for the year 2004.

Summary of Treatment Chemicals Used

There are two treatment chemicals in use at this treatment plant. Chlorine, in the form of 12% sodium hypochlorite, is used as the disinfectant. Alum, as liquid Aluminum Sulphate, is used as the coagulant for the WTP.

Chlorine is dosed at the treatment plant at a rate which ensures an adequate residual is maintained at those points in the distribution system that are farthest from the point of entry of treated water to the system and, that an adequate Contact Time (CT) value is maintained for the rate of flow. Average chlorine dosages for this treatment plant are approximately 1.91 mg/l. Residuals are routinely measured in the distribution system and the treatment plant chlorine dosages are adjusted as required to meet the distribution system target residuals and the required CT values.

Typical Alum dosages for this treatment plant range from 10 to 15 mg/l. This dosage is also adjusted regularly to ensure efficiency in the coagulation process as various changes occur in

the raw water. Changes are based on things such as pH, temperature, turbidity, and the aluminum residual in the treated water.

Chlorine is also added to the water as it passes through the James St. Booster Station. The booster station is located in Barriefield village, and pumps water from the city central distribution system into the distribution system located east of the Cataraqui River. Chlorine is added here to raise the level of chlorine slightly to ensure adequate residual remains in the water in this part of the distribution system. Fluoride is also added to this part of the system for Canadian forces Base Kingston as a requirement of the Department of National Defense to prevent tooth decay. Fluoride residual in the drinking water is typically 0.50 – 0.60 mg/l.

Summary

The Kingston Central Water Treatment Plant supplied water to residents of Kingston at rates which allowed adequate treatment while not exceeding permitted flows. Water of good quality which is safe to drink was produced by the treatment plant during this reporting period. Further information is available for this system and is included in the annual reports which can be accessed from the Utilities Kingston Website or is available at Kingston City Hall or the Utilities Kingston offices.



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Kingston Central Water Treatment Plant - **Raw Water Flows** 2004
m³

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	58,300	69,900	61,400	62,500	61,400	59,200	56,700	59,200	58,510	58,320	55,800	60,100
2	57,900	69,700	63,800	68,400	57,800	59,700	56,800	58,500	57,110	57,080	57,200	60,300
3	58,100	69,600	68,000	68,200	57,200	58,900	57,300	58,800	57,630	59,100	59,100	59,400
4	58,300	69,500	68,700	57,700	56,900	59,400	57,300	57,500	57,100	58,600	58,700	57,510
5	58,000	70,200	68,100	61,500	61,200	59,000	61,100	54,800	57,600	59,100	59,100	54,500
6	59,100	74,400	59,300	67,800	67,400	59,100	68,200	54,400	57,900	61,500	58,400	61,610
7	66,800	76,300	59,900	67,700	58,400	60,600	56,300	55,300	59,600	67,100	57,400	58,000
8	71,800	72,800	67,600	60,300	59,200	69,700	54,700	57,100	69,800	61,700	55,030	50,900
9	63,400	62,500	67,800	60,200	58,700	73,700	54,200	57,600	58,700	55,000	54,350	61,400
10	64,100	69,200	67,800	63,100	57,900	63,400	56,700	57,600	57,400	53,870	57,520	67,200
11	69,300	69,700	58,500	67,700	56,800	57,500	60,600	60,500	57,100	53,390	64,700	55,100
12	68,700	72,800	61,600	58,600	59,300	70,000	69,200	59,500	57,810	57,300	59,200	63,100
13	68,700	70,000	68,000	58,400	67,100	60,100	57,700	59,000	65,870	63,700	52,600	54,280
14	69,200	58,900	67,900	64,500	54,600	56,600	57,200	58,800	58,700	68,300	55,800	65,130
15	62,200	59,700	57,700	67,600	63,400	57,200	56,700	59,700	57,700	54,600	66,600	55,910
16	67,300	68,200	63,800	66,100	57,100	63,300	56,800	54,700	59,900	54,400	53,770	55,200
17	71,000	68,400	68,400	54,100	68,400	68,600	57,400	54,600	65,200	55,400	53,730	59,800
18	74,400	58,200	68,600	64,700	57,400	57,800	57,500	59,500	61,700	65,700	60,800	61,100
19	75,200	59,500	59,100	57,900	65,500	56,800	59,700	70,400	59,400	65,450	56,200	59,700
20	72,300	69,800	63,800	64,800	54,900	56,800	66,800	59,000	57,700	53,650	56,400	58,000
21	59,700	68,900	68,600	69,800	57,500	57,600	54,300	54,300	58,020	54,500	56,300	57,500
22	70,500	58,500	64,600	58,900	56,900	61,900	62,800	53,800	57,690	55,700	59,700	61,700
23	74,400	63,700	63,200	63,800	57,200	66,700	69,500	57,300	63,900	63,400	57,100	65,320
24	74,200	72,500	68,300	65,300	58,200	55,800	56,700	61,800	70,500	60,900	61,300	53,600
25	70,400	68,900	69,000	59,900	56,300	56,900	51,200	62,280	59,000	58,900	54,010	49,300
26	58,900	57,300	58,800	60,200	60,500	56,400	67,000	60,000	57,100	62,700	64,570	54,200
27	72,000	63,300	62,400	59,800	70,400	56,600	59,700	59,000	57,500	60,100	54,370	58,100
28	75,100	68,200	68,500	59,700	55,800	56,700	52,500	59,000	63,000	56,950	52,000	59,300
29	73,900	68,100	68,300	59,900	59,600	56,700	58,500	59,100	69,500	56,620	63,000	60,300
30	72,100		68,600	66,700	59,600	57,500	55,700	59,100	58,320	57,280	55,000	58,800
31	69,700		59,400		59,600		59,000	58,800		58,600		59,100
Total	2,085,000	1,948,700	2,009,500	1,885,800	1,852,200	1,810,200	1,825,800	1,810,980	1,806,960	1,828,910	1,729,750	1,815,460
Average	67,258	67,197	64,823	62,860	59,748	60,340	58,897	58,419	60,232	58,997	57,658	58,563
Min	57,900	57,300	57,700	54,100	54,600	55,800	51,200	53,800	57,100	53,390	52,000	49,300
Max	75,200	76,300	69,000	69,800	70,400	73,700	69,500	70,400	70,500	68,300	66,600	67,200

PTTW Amount **118,000 m³/day**

Yearly Average **61,227**
Yearly Min **49,300**
Yearly Max **76,300**



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Kingston Central Water Treatment Plant - **Peak (Raw) Flows** 2004
m³

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	61,970	75,610	73,050	74,820	73,240	65,180	60,270	68,000	62,310	67,000	64,490	74,730
2	62,120	75,940	72,610	74,820	63,281	65,550	61,540	64,000	61,570	63,000	64,000	74,800
3	61,680	75,380	74,340	74,150	62,850	65,400	60,880	64,000	63,000	66,190	91,100	66,000
4	62,120	76,000	79,220	71,830	62,290	65,280	61,500	63,000	62,000	65,740	73,590	67,000
5	61,630	75,130	73,440	77,160	79,110	64,940	72,260	62,000	61,590	66,140	66,000	61,000
6	71,850	83,850	70,620	74,010	74,020	65,080	73,120	60,000	61,050	69,940	67,000	74,460
7	93,040	81,670	71,180	74,290	64,750	77,040	71,560	60,540	75,220	75,870	66,000	62,550
8	78,700	79,660	74,010	71,910	64,750	101,580	59,810	60,250	76,350	76,180	61,000	75,560
9	76,040	74,990	73,310	65,610	65,140	84,590	60,000	61,080	73,410	63,000	65,000	76,780
10	74,580	75,250	73,740	74,150	62,100	80,880	62,000	65,000	61,080	59,000	62,000	76,780
11	74,700	79,660	72,990	74,700	61,360	64,000	73,900	73,750	60,830	59,000	74,000	67,270
12	74,950	81,950	74,050	71,250	75,720	75,870	74,900	63,760	64,000	61,130	71,640	77,690
13	74,740	75,970	73,740	64,290	77,820	73,390	72,100	61,500	75,450	75,770	59,580	61,000
14	75,340	67,820	74,220	73,860	74,960	61,680	63,000	63,500	72,050	76,740	73,180	77,950
15	73,170	70,980	72,940	73,120	78,370	61,160	62,000	64,750	62,130	60,000	75,870	75,020
16	77,070	74,250	74,420	73,800	74,370	75,010	60,870	60,020	69,840	60,000	83,190	58,130
17	77,860	79,590	74,110	64,010	76,500	74,410	61,210	58,080	73,230	63,000	61,000	75,720
18	81,790	72,100	74,000	76,270	74,530	72,420	60,980	70,380	73,230	73,410	81,770	76,030
19	86,220	71,880	65,640	72,470	79,370	61,260	74,070	76,570	64,250	78,050	78,150	72,970
20	79,740	82,330	73,950	77,940	67,630	63,000	76,900	75,090	62,580	62,000	73,820	61,010
21	74,660	74,370	73,300	74,710	75,310	67,000	56,980	66,300	63,000	56,890	73,260	62,000
22	78,670	71,140	74,400	73,930	72,930	72,100	92,000	57,270	69,000	60,040	76,340	73,350
23	82,380	74,560	74,580	76,950	73,150	73,360	75,320	64,040	73,100	74,530	77,750	81,190
24	81,430	80,950	74,120	72,740	75,870	82,000	61,910	74,360	77,110	73,080	78,430	62,000
25	75,380	75,850	74,750	65,100	71,850	61,610	58,490	73,310	73,410	69,590	60,000	58,000
26	67,790	69,480	72,370	66,080	76,210	61,360	76,370	64,510	62,000	75,370	79,060	60,470
27	80,620	73,000	73,800	65,570	81,780	61,690	71,170	63,840	63,000	89,730	71,900	65,330
28	80,600	73,710	74,120	68,910	62,270	61,010	60,110	70,360	75,850	61,000	55,560	68,000
29	81,790	73,900	74,620	73,340	65,490	62,000	80,390	69,210	74,380	61,000	73,950	78,150
30	78,980		74,180	74,840	64,200	64,000	76,670	67,000	73,660	62,000	72,600	64,000
31	74,690		69,260		65,790		62,630	68,000		59,170		67,000

Total
Average
Min
Max

93,040	83,850	79,220	77,940	81,780	101,580	92,000	76,570	77,110	89,730	91,100	81,190
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CoA Amount **118,000 m³ / day**

Yearly Average **70,466**
Yearly Min **55,560**
Yearly Max **101,580**



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Kingston Central Water Treatment Plant - **Treated Water Flows** 2004
m³

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	52,450	66,200	57,400	57,300	57,400	54,500	52,400	53,900	53,170	52,710	51,800	55,800
2	52,300	66,100	58,900	65,600	53,000	54,700	52,400	54,400	52,460	51,530	51,600	56,100
3	52,600	66,100	65,500	65,700	52,700	54,800	52,200	54,400	52,450	53,700	52,100	54,800
4	52,700	66,100	65,800	53,700	55,246	55,000	52,900	52,500	52,450	54,800	53,800	52,540
5	52,800	66,400	65,500	56,800	56,600	54,800	57,000	49,300	52,500	54,800	54,600	48,400
6	53,700	69,000	53,900	65,600	64,300	55,000	65,400	48,200	52,800	56,200	54,700	56,990
7	60,800	71,200	56,100	65,500	54,200	55,800	52,700	50,100	54,900	62,500	53,300	53,500
8	67,300	67,300	65,700	57,800	54,300	63,039	49,500	51,900	65,100	57,400	49,400	53,600
9	59,200	57,500	65,700	54,900	53,900	62,000	48,800	55,255	53,500	49,100	49,680	57,400
10	58,800	65,800	65,500	58,900	53,300	52,600	52,500	53,000	52,200	48,090	53,330	63,700
11	66,300	67,300	56,400	65,400	52,500	53,500	56,200	55,400	52,600	48,250	60,200	49,300
12	66,100	70,600	56,700	54,500	54,800	64,600	65,100	54,200	52,780	51,900	55,400	58,300
13	66,100	67,900	65,600	53,400	63,500	55,700	53,700	54,400	61,060	58,900	47,000	48,570
14	66,300	55,700	65,400	61,000	49,900	54,794	52,100	54,000	55,985	63,500	50,100	60,800
15	58,600	56,300	55,500	65,300	59,600	52,800	52,200	54,200	55,574	48,600	62,900	50,170
16	63,000	65,800	61,400	63,700	52,500	59,400	52,300	48,000	54,300	48,300	49,260	49,800
17	68,600	66,000	65,600	49,200	64,900	65,400	52,000	49,100	61,000	50,800	48,280	54,900
18	71,600	56,300	65,900	61,400	52,900	54,300	52,300	53,900	56,700	60,700	58,042	56,800
19	71,100	57,500	54,200	53,300	61,700	52,400	55,100	65,300	54,400	61,170	53,229	55,500
20	67,000	66,800	59,400	60,300	50,200	52,400	62,600	53,900	53,300	48,650	50,600	52,800
21	56,100	65,600	65,600	65,500	53,000	53,300	51,240	49,000	52,710	47,500	51,400	52,800
22	67,700	54,000	61,600	54,600	52,400	60,570	58,300	48,200	52,830	49,000	55,300	58,100
23	71,400	59,500	59,400	60,000	52,600	67,300	64,900	52,600	60,100	58,600	51,600	60,840
24	71,200	70,400	65,500	61,900	54,000	52,200	51,900	56,800	68,192	55,000	57,200	49,470
25	66,700	66,700	65,800	54,500	52,000	52,500	45,300	56,600	54,100	51,300	48,510	45,330
26	55,600	54,800	54,400	54,600	55,900	52,400	60,600	55,000	52,600	51,100	60,020	49,100
27	68,700	60,100	57,500	54,500	66,000	52,300	55,300	57,008	52,600	51,400	49,050	53,200
28	71,200	65,900	65,600	54,400	51,300	52,300	47,300	56,651	58,500	51,980	46,100	54,600
29	71,000	65,700	65,600	54,700	54,500	52,300	52,500	54,800	65,400	51,710	58,400	54,800
30	68,800		65,800	62,500	54,800	52,300	52,722	54,500	53,040	51,610	49,800	53,800
31	66,500		54,300		54,800		56,690	54,500		53,900		54,100
Total	1,962,250	1,854,600	1,907,200	1,766,500	1,718,746	1,675,003	1,686,152	1,661,014	1,669,301	1,654,700	1,586,701	1,675,910
Average	63,298	63,952	61,523	58,883	55,443	55,833	54,392	53,581	55,643	53,377	52,890	54,062
Min	52,300	54,000	53,900	49,200	49,900	52,200	45,300	48,000	52,200	47,500	46,100	45,330
Max	71,600	71,200	65,900	65,700	66,000	67,300	65,400	65,300	68,192	63,500	62,900	63,700

CoA Amount **118,000 m³ / day**

Yearly Average **56,880**
Yearly Min **45,300**
Yearly Max **71,600**



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Kingston Central Water Treatment Plant - **Peak (Treated) Flows** 2004
m³

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	54,730	68,100	66,810	72,430	65,300	56,630	55,150	56,810	55,900	55,590	54,600	67,920
2	55,180	68,270	67,010	67,960	55,740	56,960	54,050	56,700	55,660	56,270	54,390	70,280
3	54,860	67,630	67,980	67,920	55,250	57,520	53,840	56,950	54,940	56,320	54,590	57,260
4	55,200	67,850	77,750	65,610	55,090	56,850	54,800	54,740	54,740	57,140	56,720	57,220
5	55,080	76,820	67,750	66,510	72,420	57,210	67,000	58,200	54,400	57,370	57,480	50,120
6	69,250	73,950	65,980	67,990	67,500	56,410	67,810	49,970	54,920	80,590	57,450	72,640
7	68,550	74,750	67,050	67,870	56,630	68,550	65,990	53,800	66,830	75,390	55,830	55,580
8	70,550	72,680	68,030	88,170	56,590	73,231	54,440	53,760	72,300	66,830	53,850	65,080
9	67,310	66,680	68,140	56,930	56,750	68,860	52,500	54,390	64,390	54,660	61,500	72,710
10	67,140	68,100	68,230	67,610	56,370	54,530	56,080	56,260	56,410	49,690	57,080	69,850
11	68,240	73,910	66,230	67,850	54,750	61,190	64,810	74,810	54,980	50,270	67,140	62,850
12	68,490	74,430	67,810	65,160	71,290	67,800	68,770	56,810	55,750	56,490	65,540	70,050
13	68,490	72,580	68,570	55,750	69,940	64,820	65,120	56,360	68,980	67,140	52,710	52,290
14	68,500	66,040	67,860	67,260	65,430	59,824	56,270	56,520	68,053	76,050	67,250	70,030
15	67,400	66,280	66,790	68,430	69,720	55,440	54,810	56,660	59,120	53,710	68,220	67,700
16	70,590	67,770	67,790	68,430	66,640	67,810	54,540	54,110	66,420	49,990	67,880	53,640
17	73,640	67,500	67,920	54,970	69,290	68,390	54,240	51,970	68,050	56,510	66,280	70,210
18	74,360	65,230	67,770	70,000	66,540	65,460	54,330	66,040	64,080	67,730	80,763	68,820
19	75,140	66,070	64,920	66,130	70,250	54,360	67,030	77,030	57,240	69,100	76,085	66,660
20	71,800	72,660	67,520	78,380	66,670	54,600	79,320	65,570	55,800	53,310	67,130	54,930
21	67,020	67,930	67,970	68,210	68,870	56,500	52,190	53,600	54,970	49,180	65,390	54,660
22	72,520	66,640	68,120	65,900	65,830	72,779	69,800	49,860	67,680	53,340	69,360	69,730
23	74,770	72,490	67,890	67,890	66,750	74,200	67,960	57,100	67,760	68,200	68,050	70,240
24	74,220	74,380	68,240	67,390	69,630	65,470	59,480	66,660	67,770	66,670	70,120	89,160
25	70,730	82,060	67,930	56,890	68,270	54,970	52,880	65,200	65,360	53,600	49,890	47,080
26	66,190	65,490	65,260	56,960	69,190	54,330	67,750	56,580	54,430	54,470	68,020	53,510
27	72,580	67,860	66,620	56,760	80,690	54,670	65,070	54,600	55,300	55,040	65,140	56,260
28	74,170	67,320	67,770	56,940	60,150	54,930	57,960	74,265	67,730	54,590	47,190	56,900
29	74,970	67,120	68,270	64,240	56,910	54,860	68,440	57,120	68,310	54,520	67,550	72,850
30	73,410		68,280	67,620	57,180	54,710	51,000	57,020	65,000	54,260	65,620	56,320
31	68,740		65,830		58,330		56,560	57,490		54,270		56,200

Total
Average
Min
Max

75,140	82,060	77,750	88,170	80,690	74,200	79,320	77,030	72,300	80,590	80,763	89,160
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CoA Amount **118,000 m³/day**

Yearly Average **63,477**
Yearly Min **47,080**
Yearly Max **89,160**



1211 John Counter Boulevard
P.O. Box 790
Kingston, Ontario
K7L 4X7
(613) 546-1181

Kingston Central Water Treatment Plant - **Net to Distribution System** 2004
m³

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	52,225	67,325	61,900	61,463	55,150	54,050	52,325	59,385	53,920	56,048	53,113	54,075
2	50,987	67,900	63,175	62,750	55,025	54,963	53,375	60,413	53,435	54,080	52,650	54,262
3	52,975	67,670	62,800	60,487	55,775	55,775	53,063	53,650	54,850	53,925	51,462	54,200
4	54,875	67,413	60,925	58,275	58,434	56,762	55,150	56,625	52,450	55,325	52,637	52,615
5	55,950	67,747	61,975	61,900	54,387	57,613	54,562	52,300	53,775	54,875	52,687	43,937
6	57,000	66,525	61,550	61,550	56,462	55,750	56,925	51,950	54,825	56,762	52,037	55,865
7	57,987	66,775	62,850	60,775	54,763	58,500	54,500	50,363	56,925	56,162	52,250	54,288
8	62,162	67,037	61,125	59,638	53,512	61,989	54,450	50,700	55,087	55,300	53,525	53,938
9	60,850	65,375	63,300	58,838	54,013	57,050	53,000	57,130	53,800	51,200	54,930	54,587
10	63,825	69,025	61,525	57,213	56,900	55,638	52,838	54,500	54,600	50,453	52,617	55,450
11	61,950	65,650	61,313	58,425	55,875	56,350	54,850	53,675	54,813	48,700	52,850	54,363
12	65,725	66,475	61,987	59,525	57,763	57,400	56,362	53,225	53,755	57,300	53,225	53,425
13	63,737	60,700	60,087	58,350	58,437	55,325	56,025	52,150	56,710	55,525	51,238	55,508
14	66,525	58,807	60,825	60,662	56,200	59,369	55,025	51,750	57,710	54,625	53,138	54,725
15	64,563	62,450	62,063	59,300	55,662	57,075	54,000	51,950	59,249	53,550	53,525	54,970
16	66,300	61,375	61,475	59,500	55,613	58,650	53,425	51,675	57,750	54,150	52,673	55,313
17	65,187	70,420	62,525	57,713	58,337	56,962	52,000	52,775	56,125	52,900	53,343	54,563
18	67,437	61,288	62,375	58,287	56,875	57,563	52,435	55,213	53,737	54,812	55,229	53,500
19	67,425	61,325	61,775	58,963	58,175	54,838	55,325	54,875	53,050	54,607	55,892	53,962
20	66,550	61,212	59,438	58,537	55,825	54,088	56,225	54,200	55,100	52,813	51,613	54,675
21	67,425	60,800	62,000	59,425	55,775	56,600	59,603	51,513	55,073	52,263	52,263	55,800
22	65,637	62,290	61,187	59,475	53,000	56,632	55,900	52,175	56,955	52,825	53,575	55,212
23	68,072	62,842	63,000	58,125	52,600	58,862	54,887	53,575	56,875	51,625	53,775	54,015
24	66,212	77,375	61,637	57,775	54,750	55,950	53,775	53,725	62,192	52,150	52,850	53,595
25	66,325	71,575	62,800	56,225	54,175	53,250	47,175	55,925	55,863	51,788	52,785	49,118
26	65,745	61,550	61,563	56,288	54,437	51,875	55,875	56,763	54,138	52,488	52,520	50,413
27	65,438	64,788	61,625	56,563	55,125	51,775	52,712	57,458	56,913	52,638	51,375	52,337
28	67,675	60,275	61,175	56,088	56,925	53,425	52,625	53,951	58,312	53,705	51,950	53,700
29	68,000	61,312	62,300	55,450	53,375	55,300	54,863	53,037	56,362	52,235	53,825	54,200
30	67,226		62,575	57,100	54,350	52,450	55,047	53,000	55,253	50,447	54,450	53,425
31	66,650		60,187		56,488		54,177	52,925		54,163		53,312
Total	1,958,640	1,885,301	1,915,037	1,764,665	1,724,183	1,681,829	1,682,499	1,672,551	1,669,602	1,659,439	1,590,002	1,663,348
Average	63,182	65,010	61,775	58,822	55,619	56,061	54,274	53,953	55,653	53,530	53,000	53,656
Min	50,987	58,807	59,438	55,450	52,600	51,775	47,175	50,363	52,450	48,700	51,238	43,937
Max	68,072	77,375	63,300	62,750	58,437	61,989	59,603	60,413	62,192	57,300	55,892	55,865

Yearly Average **57,017**
Yearly Min **43,937**
Yearly Max **77,375**



1211 John Counter Boulevard
P.O. Box 790
Kingston, Ontario
K7L 4X7
(613) 546-1181

Kingston Central Water Treatment Plant - **City East** Flows 2004
m³

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	6,550	4,838	7,757	7,662	6,830	6,337	6,580	5,481	6,518	6,302	5,808	6,161
2	5,411	7,540	7,735	7,442	6,714	6,175	6,599	6,020	6,318	6,224	5,454	5,909
3	6,766	7,469	7,495	7,520	7,420	7,068	6,459	6,227	6,057	6,169	5,151	5,555
4	6,025	6,767	7,152	7,726	7,054	6,925	7,402	5,324	5,838	6,180	5,303	6,010
5	6,630	7,835	7,153	7,163	6,685	7,172	6,150	5,920	6,018	6,478	5,353	5,505
6	7,090	6,816	7,661	7,644	6,847	7,335	7,586	6,503	6,715	8,092	4,949	6,565
7	5,934	6,950	7,505	7,689	6,672	7,047	6,153	5,616	6,251	6,184	5,252	6,262
8	7,390	7,733	6,981	7,125	6,934	8,268	7,223	6,842	5,868	6,066	5,353	5,681
9	7,760	7,003	7,890	7,429	6,276	6,595	5,851	6,202	5,429	5,469	7,626	6,969
10	7,294	7,307	6,835	6,404	7,715	7,465	6,465	6,166	5,736	6,251	4,545	5,353
11	7,280	7,506	7,472	7,610	6,507	6,601	7,020	6,336	5,842	5,554	5,808	6,313
12	7,584	7,215	7,335	7,434	7,674	7,275	7,267	6,112	5,220	6,320	5,252	6,262
13	6,781	7,344	7,090	6,960	7,551	5,975	7,444	6,430	6,477	5,961	5,252	6,363
14	7,884	6,993	7,153	7,746	6,472	6,183	7,388	6,430	5,589	5,620	5,353	6,414
15	6,635	7,063	7,782	6,977	7,704	6,718	5,946	6,134	5,811	5,317	5,909	6,111
16	7,652	7,320	6,823	7,478	7,113	7,266	6,672	6,004	6,243	6,482	5,757	7,029
17	7,449	7,690	6,779	6,459	6,600	6,488	5,567	6,004	5,606	4,879	5,354	6,171
18	7,384	7,299	7,657	7,074	7,398	6,529	7,146	6,648	5,854	6,101	6,060	6,111
19	7,033	7,012	7,016	7,115	7,422	6,903	6,536	6,065	5,388	5,849	6,010	5,808
20	7,268	7,131	7,365	7,065	7,000	7,601	7,942	6,469	5,852	5,653	5,050	6,919
21	8,366	6,851	7,684	7,563	6,298	7,200	7,339	5,392	5,631	5,187	5,858	7,524
22	7,034	7,688	7,571	7,088	6,389	6,822	6,412	6,527	6,406	6,352	5,858	7,373
23	7,888	7,300	7,809	6,882	6,105	6,822	7,115	6,358	5,848	5,383	5,904	6,565
24	7,046	6,768	7,117	7,517	6,937	6,666	6,709	5,688	8,408	6,146	5,759	7,323
25	7,321	6,907	8,142	6,680	6,340	7,152	6,709	7,273	7,377	5,414	5,151	7,121
26	7,678	6,772	8,137	6,800	6,573	5,806	7,369	7,531	5,550	6,067	5,000	7,070
27	7,360	7,711	7,084	7,715	6,630	6,529	7,057	6,034	5,985	6,647	5,454	7,171
28	7,415	7,006	7,680	6,757	6,942	6,033	5,608	5,948	6,384	6,478	5,656	7,222
29	7,062	7,357	7,372	7,015	6,014	6,682	7,170	6,381	6,162	5,901	5,808	7,171
30	7,543		7,491	7,124	7,038	6,298	5,920	4,741	6,510	5,901	5,858	7,020
31	6,486		7,686		7,277		6,323	6,021		6,826		6,969
Total	220,998	207,189	230,410	216,863	213,131	203,937	209,126	190,827	182,891	187,453	166,902	201,999
Average	7,129	7,144	7,433	7,229	6,875	6,798	6,746	6,156	6,096	6,047	5,563	6,516
Min	5,411	4,838	6,779	6,404	6,014	5,806	5,567	4,741	5,220	4,879	4,545	5,353
Max	8,366	7,835	8,142	7,746	7,715	8,268	7,942	7,531	8,408	8,092	7,626	7,524

Yearly Average **6,641**
Yearly Min **4,545**
Yearly Max **8,408**

** Nov, Dec flows estimated, due to partial meter bypass.
Estimates based on pump run times*