
# Water Treatment Plant

# 2015 Summary Report

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# 2015 Summary Report

## Overview

The Town of Perth Drinking Water System (DWS), categorized as a large municipal residential system, is comprised of two components:

1. Class III Water Treatment Subsystem,
2. Class I Water Distribution Subsystem.

This report is prepared in accordance to the Drinking Water Systems Regulation 170/03, Schedule 22 of the Safe Drinking Water Act, (SDWA), 2002.

- It will cover a period for the preceding calendar year, January 01 to December 31, 2015.

- A Ministry of Environment inspection of both facilities was conducted December 9 - 10, 2015 for the 2015 reporting year. The report is not available to date.

- The completion and presentation of this report will also fulfill the requirement for a compliance report to be produced in accordance applicable regulations.

- Supplemental information sources would include, but not limited to,
  - The Town of Perth Water Treatment Plant's year end documentation.

- Section 1 contains,
  - any known failure to meet, or any priority concerns that might lead to failures to meet, the requirements of:
    - the SDWA itself,
    - the SDWA regulations and associated MOE publications,
    - the system's Certificate of Approval,
    - any orders
    - duration of the failure, and measures taken to correct the failure

- Section 2 contains,
  - A summary of quantities and flow rates of water taken from the Tay River, in addition to water production and process wastewater generation.

- Section 3 contains,
  - an overview summary of the DWS water treatment abilities
  - a summary of the DWS water taking ability
  - a summary of the DWS water storage ability
  - a summary of the DWS operating personnel

## SECTION 1 – FAILURE TO MEET REQUIREMENTS

1.1 Adverse Water Quality Incident reports (Drinking Water System)

On Jan 19, 2015 an AWQI was generated when staff notified Spills Action Centre of an unfavourable condition at the WTP – higher than desired chlorine residuals (>4.0 mg/L) were pumped to the distribution system for approx. 7 minutes. This was a result of a failed chemical pump tube that allowed sodium hypochlorite to seep past the check valve and saturated the dosing point. Upon the next service water pump over, the chlorine was discharged into the distribution network with the treated water. Corrective actions were taken immediately and upon further consultation with the local Medical Officer of Health, it was deemed that impact to the public was negligible and no further actions were required. At the time of the event, staff reviewed the regulations and were uncertain as to whether this incident was in fact an adverse condition. As a precaution, the notifications to SAC and MOH were made and subsequent discussions with local MOECC Inspector revealed that it was NOT and adverse condition.

| Incident Date | Parameter | Result | Regulatory Limit | Corrective Action | Corrective Action Date |
|---|---|---|---|---|---|
| **Jan 19 2015** | **Treated Water Residual** | **4.45** | **4.0** | **Faulty chemical tube replaced** | **Jan 19 2015** |

1.2 Ministry Orders

1.2.1. Drinking Water System
No MOE orders issued.

1.2.2. Water Treatment Subsystem
No MOE orders issued.

1.2.3. Water Distribution Subsystem
No MOE orders issued.

1.3 Additional Known Failures to Meet Requirements

At the time of compilation of this annual report the MOE's inspection report for this period had not yet been received. Non-compliance issues form the previous inspection (2014) that were addressed in 2015, are summarized below.

1.3.1. Drinking Water System
No known failures to meet requirements.

**1.3.2. Water Treatment Subsystem**

| Requirement failure | Requirement location | Duration of failure | Any corrective action taken |
|---|---|---|---|
| 1) Process waste water discharges to surface water under the Ontario Water Resources Act. | Tay River. | Mar 1 2015 and previous | The facility's license 160-101(issue #3) was amended to address compliance limits for Phase 1 of the Residue Management System. Phase 2 is scheduled to be implemented in 2016 |

| | | | |
|---|---|---|---|
| 2) Form 2 documents, as required by the DWWP, were not completed at the time of inspection | | | A memo was sent to staff and a review of the requirements of Form 2's was undertaken. The missing Form was completed. |

### 1.3.3 Water Distribution Subsystem

| Requirement failure | Requirement location | Duration of failure | Any corrective action taken |
|---|---|---|---|
| 1) Form 1 documents, as required by the DWWP, were not completed at the time of inspection | | | 1) A memo was sent to staff and a review of the requirements of Form 1's was undertaken. The missing Form was completed |
| 2) During lead sampling, pH of the sample was not taken 'immediately' | | | 2) The municipality purchased a portable pH meter for use during lead sampling, and the regulatory requirements of Lead sampling were added to staff workbook. |

## 1.4 Additional concerns regarding meeting requirements

### 1.4.1. Drinking Water System

| Issue | Any corrective action taken |
|---|---|
| none | |

### 1.4.2. Water Treatment Subsystem

| Issue | Any corrective action taken or being proposed |
|---|---|
| GAC Quality and Filter Reconstruction | The GAC media used in the filtration process has a life expectancy of approx. 5 years. Testing of the media occurs once or twice per year and results are showing the need for replacement. This work has been pre-approved for the 2016 budget year and will be co-ordinated with the replacement of the underdrain infrastructure of Filter 2 (still original clay tile) |
| Operational Equipment Replacement (including SCADA) | A number of operational items and equipment were replaced in 2015. Of note were two below grade flow control valves that were failing and required third party fabrication contractors to install. SCADA programming has been completed, however additional equipment to support Raw Water automation will be purchased and the associated programming will need to be done. |

### 1.4.3. Water Distribution Subsystem

| **Issue** | **Any corrective action taken or being proposed** |
|---|---|
| none | |

## SECTION 2 – SUMMARY OF PLANT FLOWS

2.1 Raw Water (Source water)

When reviewing the 2015 raw water flows (from source), and the allowable water taking ability in accordance with the current Permit to Take Water (PTTW), of 9,090 $m^3$: See Table 1 at end of document. Table 3 at end of document shows a complete listing of Daily Raw Water Taking in 2015.

2.1.1. Average Daily Raw Water Flow:

The daily average raw water flow was 3,214 $m^3$ in 2015, or approximately 35.35% of the PTTW, The daily average in 2014 was 3,183 $m^3$ showing continued consistent water demand over recent years.

2.1.2 Maximum Raw Water Flow:

The maximum raw water flow in any given day in 2015 was 6,401 $m^3$ which is 70.4% of the PTTW maximum.

2.2 Service Water (Treated Discharged Water)

Below are salient points regarding 2015 service water flows (treated water to the distribution system)

2.2.1 Average Daily Service Water Flow:

The daily average service water flow was 3,057 $m^3$ in 2015. This represents a slight increase of 24 cubic metres or a 0.79% from 2014 (3,033 $m^3$ was the average in 2014).

2.2.3 Service Water Discharge:

In 2015, a total of 1,115,473 $m^3$ service water was discharged to the Town. Increased slightly from 2014 (1,107,169 $m^3$)

2.3 Plant process water

The 2015 year marked a significant change to the management of process waste water at the facility. The plant was built to direct all sources of process waste (settled sludge, backwash water) to a sub-grade channel that conveyed waste back to the source, at a deposit point downstream of the intake. This issue had been identified on previous MOECC reports and after working with the Ministry and various consultants a system was installed to further treat this process waste. This system receives wasted sludge to a mixing tank where a polymer is added to form 'floc' and is then pumped to a 'Geobag' which allows for dewatering and containment of the sludge. A network of bags allows for rotational use and disposal of dried sludge at the Town's landfill site. The project was broken into two phases. Phase 1 (settled sludge from coagulation/settling process), was completed and implemented in March of 2015. The Drinking Water License was amended to regulate the maximum

allowable concentration of Total Suspended Solids from the system. The second phase of implementation will address all other sources of waste with the backwash water being the largest volume. Completion has been mandated for Dec 31 2016.

### 2.3.1 Waste Volumes

Since March 1 2015 (compliance date for Phase 1 – settling tanks), a total volume of 17,362 m3 has been directed to the residue treatment system and thereby lessening the amount of solids deposited back to the river.

## SECTION 3 – SUMMARY OF DRINKING WATER SYSTEM ABILITIES

3.1. Water Treatment Ability

The Perth water treatment plant continues to maintain a strong position in supporting its ability to provide a reliable supply of safe, clean drinking water to its community. Funding reserves are maintained in case of an operational emergency or unexpected major breakdown.

3.1.1. Disinfection ability

Disinfection of the drinking water is ultimately achieved through two points of application – primary disinfection – dosed as water enters the clear well and secondary disinfection – dosed at the treated water discharge point. Both of these critical treatment processes have redundancy in the pumps as well as the dosage lines. It should be noted that many other factors contribute to the overall disinfection process, including pre-treatment, coagulation and pH control. Varying raw water conditions require operators to adjust and control chemical dosages to meet regulations in a cost effective manner. Of most importance is the daily CT calculation. The CT value is the product of the concentration of a disinfectant and the contact time with the water being disinfected.

As mentioned in previous reports the proximity and position of the sodium hypochlorite and coagulant tanks is a potential safety hazard. Accidental contact between the two chemicals produces a highly exothermic reaction releasing chlorine gas. The building analysis of 2011 reviewed chemical storage at the plant and determined that long-term safe chemical handling should be addressed. Tender No. PS-13-10 was circulated in November 2013 and listed the safety concerns that need to be addressed in the chemical room. Some ventilation issues were addressed, however, separated chemical storage was not. Spill containment was installed in the acid room in 2013. This item has been noted on the annual MOE Inspection reports for many years and continues to be an area of concern, especially as 'unmanned' automated operations are on the horizon.

3.1.2. Chlorine Dioxide use

Chlorine dioxide continues to be generated seasonally on site and plays an important role in achieving disinfection while mitigating the formation of chlorine disinfection by-products such as THM's and HAA's (see 3.1.1 above). These disinfection by-products are suspected carcinogens and are commonly formed when high doses of chlorine gas or sodium hypochlorite react with raw water heavily laden with organic matter. Chlorine dioxide use is uncommon among water treatment facilities due to chemical cost however the advantage of a "cleaner" disinfection process with less by-product formation is worth the extra cost during extreme seasonal water quality

challenges seen in Perth. As well, the MOECC has issued notification that the concentration standards for chlorates and chlorites (a by-product of chlorine dioxide use) will be imposed in 2017. Perth staff has proactively begun to monitor results in our system in 2016 to establish some baseline results.

3.1.3. pH adjustment (use of lime)

Following the coagulation and disinfection processes, where the pH of the water is lowered through the addition of chemicals, hydrated lime needs to be mixed in the clearwell to return the pH to a range of 7.1 to 7.3. This range is desired in an effort to ensure the water within the distribution system is close to neutral and thereby not aggressive in the deterioration of the distribution network as well as homeowner plumbing and fixtures. The Town of Perth qualified for relief from the legislated lead sampling program in 2011 as a result of few exceedances of the lead maximum allowable concentration.

3.1.4. Coagulation abilities

The water treatment plant employs a high-end coagulant called PAX XL-6 to aid in the flocculation and sedimentation of suspended solids in water prior to filtration. Although more expensive than conventional coagulants such as aluminum sulphate, product usage is reduced and outperforms other less expensive chemicals at certain critical temperature ranges. Winter months and the associated cold water temperature and density present the most difficult conditions for the coagulant to settle the solids. Our new licence allows for pH enhancement (use of HCl) in situations of high pH or alkalinity raw water conditions that make floc formation difficult.

3.1.5. Pumping capacity

The total volume of treated water pumped from the WTP in 2015 was 1,115,473 $m^3$. This total increased slightly from 2014, but generally represents the average from the past 5 years. Continued reconstruction, maintenance, leak repairs, decreased industry usage, and public awareness of water conservation are all attributed to considerably less water demand. (2005 treated water pumped – 1,583,302 $m^3$)

3.1.6. Computer System

A new SCADA (Supervisory Control and Data Acquisition) system was completed in 2014; however some modifications and additions to the programming are still required. With the objective of low lift automation, numerous pieces of equipment, chemical pumps and analyzers are still being added to the infrastructure and controls for these items must then be programmed into the SCADA system. The existing hydro service (and electrical capability within the plant) is very near its maximum capability and

should be addressed in the 2016 year to continue to allow for large consumption items such as filter blower and Residue management phase 2 equipment.

3.2. Water Taking Ability

The WTP is operating well within the PTTW limits. The Permit To Take Water (#5464-6MHL84) authorizes the municipality to take water with maximum volumes regulated for both litres/min as well as litres per day. Raw Water pump capacities determine these figures (6,360 l/min and 9,092,000 l/day). In 2015, the maximum day total was 6,401,000 litres, which occurred during a four day stretch of vigorous spring flushing of the distribution network. More typical day averages are around 3,200,000 litres per day. This represents about 2/3 of the water plants rated capacity. Staff routinely inspects the inlet at the golf course for debris, blockages or structural damage. The 24" inlet isolation valve, located at the rear of the plant was replaced in 2015. This valve had been a necessary repair for a few years. It was installed by ODS Marine and equipped with a floor level actuator that will allow operators to close and protect the plant, in case of a contaminated raw water supply.

3.3. Water Storage Ability

The clear well and reservoir were cleaned and inspected again in 2015. While on site, the contracted dive crew also pressure washed and inspected the underwater valve network to establish more information and potential pricing for replacing these valves. The elevated tank had an inspection completed in October of 2014, and a mesh installed on the overflow pipe. This item had been identified on past MOECC Inspection Reports. Regular maintenance and emergency repairs occurred within the distribution system including mains, services and hydrants. Of note in 2015, was the complete rebuild of McLean Blvd, which had a long history of unexpected leaks and dirty water complaints from consumers.

3.4. Water Treatment and Distribution Personnel

The WTP is a Class III facility and is staffed 16 hours a day, from Monday to Friday, and Saturday/Sunday shifts are 12 hrs. Shifts and duties are rotated amongst three full time operators and a Lead Hand, who covers shifts during times of vacation, illness or absenteeism. The Lead Hand has WTP Level II license, one shift operator has a level III licence and two operators have a level II licence.

The Distribution system is a Class 1 facility and is maintained by a Lead Hand and four operators, who rotate through other departments within the organization. The Lead Hand possesses a level III license in distribution and supply. Three operators have a level II licence in water distribution and the fourth has achieved his level I.

14 January 2015

Graham Patterson
Lead Hand – WT and WWT

## Table 1 – Summary of Flows January 1, 2015 to December 31, 2015
Perth Water Treatment Plant

PTTW maximum allowable flow rate: **9,090 $m^3$/ day**

| | Raw water ($m^3$) | | Discharge (Service) Water ($m^3$) | |
|---|---|---|---|---|
| **Month** | **Monthly Daily Average Flow** | **Monthly Total Flow** | **Monthly Daily Average Flow** | **Monthly Total Flow** |
| January | 3,020 | 93,629 | 2,872 | 89,034 |
| February | 3,413 | 95,551 | 3,290 | 92,127 |
| March | 3,487 | 108,085 | 3,298 | 102,245 |
| April | 3,286 | 98,580 | 3,157 | 94,709 |
| May | 3,563 | 110,447 | 3,392 | 105,161 |
| June | 3,230 | 96,904 | 3,002 | 90,061 |
| July | 3,176 | 98,452 | 3,048 | 94,488 |
| August | 3,101 | 96,118 | 3,015 | 93,474 |
| September | 3,128 | 93,839 | 2,979 | 89,363 |
| October | 3,154 | 97,759 | 2,998 | 92,933 |
| November | 3,077 | 92,311 | 2,852 | 85,572 |
| December | 2,936 | 91,007 | 2,784 | 86,306 |
| **Year Average** | **3,214** | **97,724** | **3,057** | **92,956** |
| **Year Total** | | **1,172,682** | | **1,115,473** |

## Table 2 – Historical Average Daily Service Water Flow ($m^3$)

Perth Water Treatment Plant

| | 2015 | 2014 | 2013 | 2012 | 2011 |
|---|---|---|---|---|---|
| **JAN.** | 2,872 | 3,211 | 2,795 | 2,521 | 3,039 |
| **FEB.** | 3,290 | 2,980 | 3,504 | 2,708 | 3,020 |
| **MARCH** | 3,298 | 3,053 | 3,644 | 2,741 | 2,985 |
| **APRIL** | 3,157 | 3,247 | 3,565 | 2,698 | 2,847 |
| **MAY** | 3,392 | 3,003 | 3,187 | 3,098 | 3,156 |
| **JUNE** | 3,002 | 3,285 | 2,845 | 3,109 | 3,169 |
| **JULY** | 3,048 | 3,292 | 3,034 | 3,441 | 3,036 |
| **AUG.** | 3,015 | 3,099 | 3,076 | 3,137 | 3,291 |
| **SEPT.** | 2,979 | 2,992 | 2,839 | 2,962 | 3,009 |
| **OCT.** | 2,998 | 2,901 | 2,894 | 2,839 | 2,173 |
| **NOV.** | 2,852 | 2,693 | 2,916 | 2,658 | 2,499 |
| **DEC.** | 2,784 | 2,642 | 3,134 | 2,578 | 2,475 |
| **MAXIMUM** | **3,392** | **3,292** | **3,644** | **2,917** | **3,291** |
| **MINIMUM** | **2,784** | **2,642** | **2,795** | **2,155** | **2,173** |
| **AVERAGE** | **3,057** | **3,033** | **3,119** | **2,892** | **3,119** |

# Table 3 - 2015 Raw Water Taking
# Perth Water Treatment Plant

| 2015 Day | January | February | March | April | May | June | July | August | September | October | November | December |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2,283,000 | 2,749,000 | 3,139,000 | 3,460,000 | 3,322,000 | 3,902,000 | 2,955,000 | 2,515,000 | 3,204,000 | 2,851,000 | 2,846,000 | 2,995,000 |
| 2 | 3,220,000 | 3,233,000 | 4,087,000 | 3,603,000 | 2,847,000 | 3,038,000 | 3,035,000 | 2,557,000 | 3,360,000 | 2,962,000 | 3,202,000 | 3,212,000 |
| 3 | 2,319,000 | 3,482,000 | 3,428,000 | 3,598,000 | 2,896,000 | 3,287,000 | 2,856,000 | 2,392,000 | 3,389,000 | 2,366,000 | 3,150,000 | 2,931,000 |
| 4 | 2,552,000 | 3,411,000 | 2,931,000 | 3,384,000 | 5,710,000 | 3,428,000 | 2,632,000 | 3,367,000 | 3,970,000 | 2,875,000 | 3,186,000 | 3,624,000 |
| 5 | 2,836,000 | 3,215,000 | 3,503,000 | 4,526,000 | 6,401,000 | 3,008,000 | 3,191,000 | 3,069,000 | 2,702,000 | 5,137,000 | 3,294,000 | 2,681,000 |
| 6 | 3,011,000 | 3,278,000 | 3,848,000 | 3,197,000 | 5,845,000 | 2,551,000 | 3,679,000 | 2,790,000 | 2,850,000 | 5,228,000 | 3,079,000 | 2,704,000 |
| 7 | 2,984,000 | 2,999,000 | 2,908,000 | 3,233,000 | 5,523,000 | 2,787,000 | 3,617,000 | 3,713,000 | 2,982,000 | 4,961,000 | 2,625,000 | 3,318,000 |
| 8 | 3,528,000 | 2,868,000 | 2,844,000 | 3,915,000 | 3,754,000 | 3,914,000 | 3,026,000 | 2,521,000 | 3,266,000 | 3,295,000 | 2,776,000 | 3,199,000 |
| 9 | 3,023,000 | 3,860,000 | 3,799,000 | 3,299,000 | 3,120,000 | 3,797,000 | 2,805,000 | 2,643,000 | 3,377,000 | 3,119,000 | 3,311,000 | 2,911,000 |
| 10 | 2,848,000 | 3,513,000 | 3,423,000 | 3,250,000 | 3,413,000 | 3,025,000 | 4,126,000 | 3,346,000 | 3,309,000 | 2,624,000 | 3,095,000 | 3,638,000 |
| 11 | 2,721,000 | 3,317,000 | 3,595,000 | 2,985,000 | 3,738,000 | 4,377,000 | 2,963,000 | 3,201,000 | 3,651,000 | 2,660,000 | 2,839,000 | 2,914,000 |
| 12 | 3,116,000 | 3,640,000 | 3,156,000 | 3,089,000 | 3,920,000 | 2,860,000 | 3,297,000 | 3,003,000 | 2,517,000 | 2,843,000 | 3,003,000 | 2,652,000 |
| 13 | 3,001,000 | 3,986,000 | 3,271,000 | 3,617,000 | 3,102,000 | 2,422,000 | 3,790,000 | 3,165,000 | 2,398,000 | 2,844,000 | 3,616,000 | 2,758,000 |
| 14 | 3,574,000 | 3,176,000 | 3,226,000 | 3,431,000 | 3,305,000 | 2,686,000 | 3,083,000 | 3,509,000 | 3,688,000 | 2,978,000 | 2,388,000 | 3,152,000 |
| 15 | 3,116,000 | 4,154,000 | 2,836,000 | 3,346,000 | 3,177,000 | 3,348,000 | 3,105,000 | 2,725,000 | 3,167,000 | 2,817,000 | 2,734,000 | 3,041,000 |
| 16 | 3,110,000 | 3,225,000 | 3,604,000 | 3,237,000 | 2,455,000 | 3,264,000 | 4,034,000 | 2,928,000 | 3,212,000 | 3,313,000 | 2,951,000 | 2,908,000 |
| 17 | 2,553,000 | 3,311,000 | 3,452,000 | 3,636,000 | 2,733,000 | 3,404,000 | 2,988,000 | 3,614,000 | 2,980,000 | 2,700,000 | 2,959,000 | 3,082,000 |
| 18 | 2,787,000 | 3,899,000 | 3,217,000 | 2,793,000 | 3,028,000 | 3,456,000 | 2,636,000 | 3,304,000 | 3,695,000 | 2,683,000 | 2,954,000 | 3,403,000 |
| 19 | 3,268,000 | 3,603,000 | 3,343,000 | 2,915,000 | 3,011,000 | 3,150,000 | 2,862,000 | 3,319,000 | 2,422,000 | 3,155,000 | 3,037,000 | 2,620,000 |
| 20 | 3,329,000 | 3,411,000 | 4,244,000 | 3,362,000 | 3,691,000 | 2,728,000 | 3,512,000 | 3,079,000 | 2,435,000 | 2,918,000 | 2,873,000 | 2,731,000 |
| 21 | 3,426,000 | 2,871,000 | 3,131,000 | 3,012,000 | 3,677,000 | 2,699,000 | 3,108,000 | 3,664,000 | 3,321,000 | 3,262,000 | 2,621,000 | 2,886,000 |
| 22 | 3,360,000 | 3,553,000 | 3,005,000 | 3,039,000 | 3,305,000 | 3,577,000 | 3,167,000 | 2,652,000 | 3,685,000 | 3,041,000 | 3,477,000 | 2,875,000 |
| 23 | 3,046,000 | 3,359,000 | 3,736,000 | 2,929,000 | 2,660,000 | 3,536,000 | 3,767,000 | 2,711,000 | 3,278,000 | 2,905,000 | 3,163,000 | 3,308,000 |
| 24 | 2,803,000 | 3,822,000 | 3,358,000 | 3,670,000 | 3,817,000 | 3,903,000 | 3,154,000 | 4,891,000 | 2,845,000 | 2,596,000 | 3,410,000 | 2,860,000 |
| 25 | 2,865,000 | 3,492,000 | 4,155,000 | 2,652,000 | 2,730,000 | 3,320,000 | 2,711,000 | 2,736,000 | 3,104,000 | 2,655,000 | 3,433,000 | 2,461,000 |
| 26 | 3,293,000 | 3,478,000 | 4,060,000 | 2,678,000 | 3,861,000 | 3,299,000 | 2,652,000 | 3,054,000 | 2,807,000 | 3,864,000 | 4,087,000 | 2,498,000 |
| 27 | 2,876,000 | 3,457,000 | 4,147,000 | 3,168,000 | 3,582,000 | 2,575,000 | 3,174,000 | 3,175,000 | 2,581,000 | 3,302,000 | 3,488,000 | 2,585,000 |
| 28 | 3,898,000 | 3,189,000 | 3,167,000 | 3,152,000 | 3,425,000 | 2,782,000 | 2,936,000 | 3,858,000 | 3,027,000 | 2,814,000 | 2,726,000 | 2,737,000 |
| 29 | 3,028,000 | | 3,185,000 | 3,333,000 | 3,359,000 | 3,628,000 | 3,042,000 | 2,484,000 | 3,585,000 | 2,969,000 | 2,753,000 | 2,596,000 |
| 30 | 3,224,000 | | 4,813,000 | 3,071,000 | 2,632,000 | 3,153,000 | 3,367,000 | 2,571,000 | 3,032,000 | 3,183,000 | 3,235,000 | 3,187,000 |
| 31 | 2,631,000 | | 3,474,000 | | 2,408,000 | | 3,182,000 | 3,562,000 | | 2,839,000 | | 2,540,000 |
| | | | | | | | | | | | | |
| Minimum | 2,283,000 | 2,749,000 | 2,836,000 | 2,652,000 | 2,408,000 | 2,422,000 | 2,632,000 | 2,392,000 | 2,398,000 | 2,366,000 | 2,388,000 | 2,461,000 |
| Maximum | 3,898,000 | 4,154,000 | 4,813,000 | 4,526,000 | 6,401,000 | 4,377,000 | 4,126,000 | 4,891,000 | 3,970,000 | 5,228,000 | 4,087,000 | 3,638,000 |
| Average | 3,020,290 | 3,412,536 | 3,486,613 | 3,286,000 | 3,562,806 | 3,230,133 | 3,175,871 | 3,100,581 | 3,127,967 | 3,153,516 | 3,077,033 | 2,935,710 |