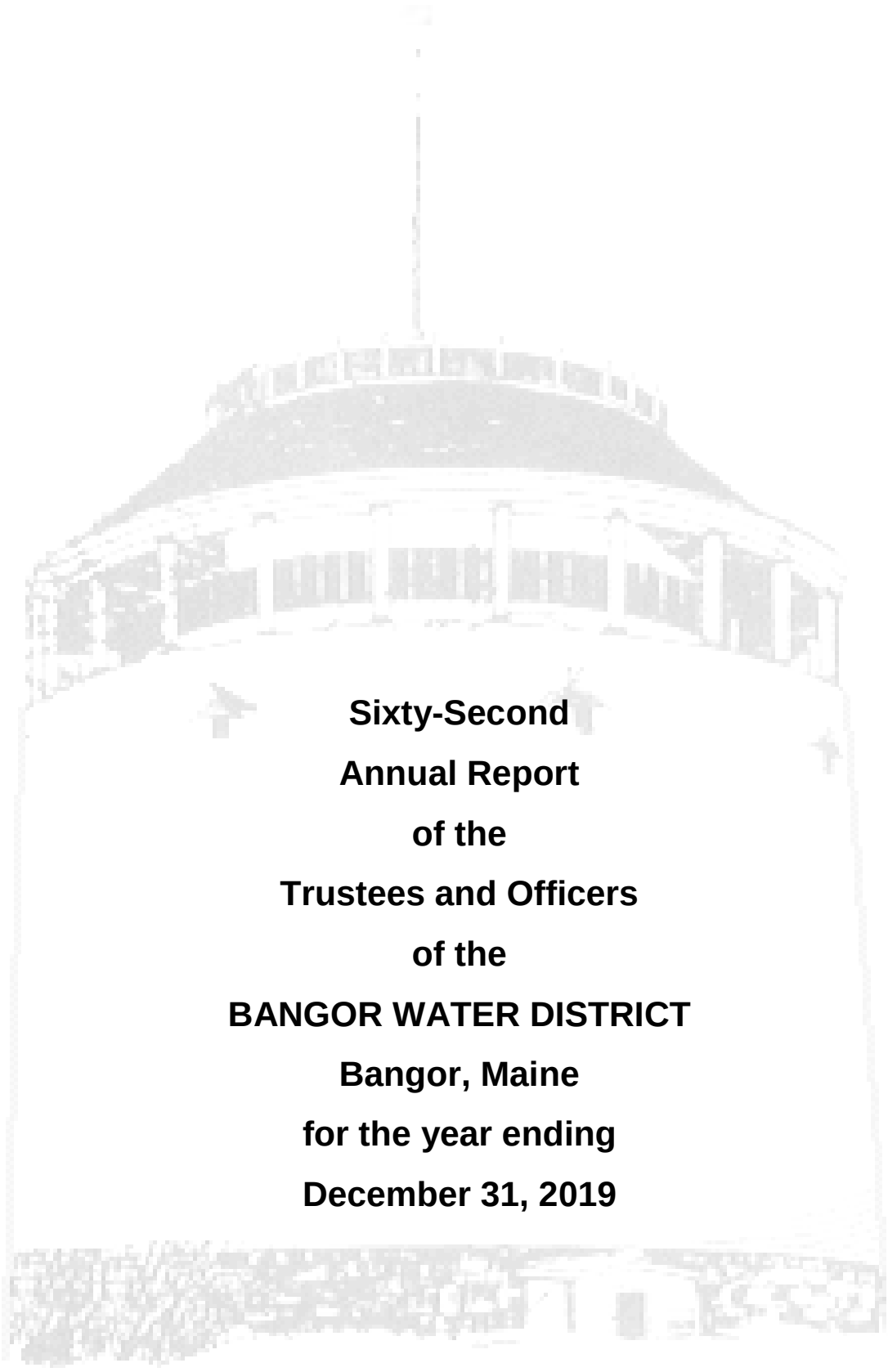

Sixty-Second
Annual Report
of the
Trustees and Officers
of the
BANGOR WATER DISTRICT
Bangor, Maine
for the year ending
December 31, 2019

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TRUSTEES OF BANGOR WATER
2019

Ralph Foss, vice chair	Term expires 2021
Richard Fournier*	Term expires 2020
Laurel Grosjean	Term expires 2020
Patricia Hamilton	Term expires 2019
Gerry Palmer, chair	Term expires 2021
Robert Sypitkowski	Term expires 2020
Dan Wellington, clerk	Term expires 2019

*resigned in November due to election to City Council. Not replaced until annual appointments in January.

OFFICERS OF BANGOR WATER
2019

Kathy Moriarty	General Manager
Rachel Bailey	Treasurer

BANGOR WATER
General Information

Did you know that

- Bangor Water pumps and treats approximately 4,400,000 gallons of water each day.
- The water is delivered through 200 miles of pipeline ranging up to 30 inches in diameter.
- Bangor Water supplies more than 55,000 people in the greater Bangor area.
- The water comes from Floods Pond in Otis, and is piped under the Penobscot River to reach Bangor. The Penobscot River was abandoned as a water source 61 years ago.
- Bangor Water is a quasi-municipal corporation, chartered by the State of Maine, and is a separate entity from the City of Bangor. The formation of the District was approved by voters in 1957. The only source of revenue is money raised through water bills, public and private fire protection, and other utility services.

History

The history of public water in Bangor began in 1875 when officials contracted with the Holly Co. for the installation of 77,000 feet of water mains to be used for domestic, industrial and fire protection. Water from the Penobscot River replaced the individual wells and cisterns as the source of supply.

Later in the century and into the 1900's, Bangor experienced typhoid epidemics nearly every year. Local officials appointed a citizen committee to determine the cause of the problem, and during the investigation it found that among the local schools, only those using "City" water had an incident of the disease. Other signs also indicated that the water supply was the principal carrier. To correct this situation, a filter plant was completed in 1908. This plant utilized coagulation, sedimentation, and filtration, and was capable of handling 8,000,000 gallons of water per day. Later, chlorination facilities were installed to provide disinfection.

Expansion of the system continued until 1957 when it was agreed--after long debate--that Bangor must switch its water supply from the river (heavily polluted by upstream dumping of sewage and mill waste) to some other source if the quality of water provided to the citizens was to be improved.

An act of the Maine Legislature in 1957 created the Bangor Water District, which was approved in a City referendum. After formation of a Board of Trustees, the title to the City water system was handed to the new water utility. In essence, the act authorized Bangor Water to control a number of ponds to supply water to Bangor and surrounding towns. Floods Pond in Otis was chosen following careful testing over a number of years by staff. A total of $4,000,000 in Series "A" bonds financed construction of a new pump station at Floods Pond and a transmission line from the pond to Bangor.

With the new system in operation in 1959, the water-powered Deane Pump located in the old water works building on the Penobscot River gave way to electric turbine pumps at Johnston Pump Station at Floods Pond. Subsequently the old filter plant building on State Street was converted to work shops and storage space, and a new office building was constructed. The "new" water from Floods Pond was of such high quality that it did not require extensive treatment.

In the following decades, increasingly sophisticated equipment was added to our facilities, the Thomas Hill Standpipe became a National Historic landmark, and customers were changed from "flat rate" to "metered" service to provide more equitable distribution of charges and to encourage conservation.

In 1995, a new treatment plant was constructed on the access road to Floods Pond in response to changing federal regulations. The plant utilizes ozone--instead of chlorine--as the primary disinfectant, and chloramines (a combination of chlorine and ammonia) as a secondary disinfectant.

At the invitation of the Town of Hermon in 1999, Bangor Water expanded its service area with a 14,000-foot extension of 12-inch main on Odlin Road from Dowd Road in Bangor into Hermon and along Coldbrook Road. The expansion, funded by the Town of Hermon, also included more than a dozen new hydrants, and a new standpipe and control valve building.

In 2002, at the invitation of the Town of Orrington, Bangor Water again expanded its existing service area. The Town completed a 3500-foot water line extension to serve customers along Rt. 15, funded by the municipality. The 12-inch pipe provides water service to 90 or more customers, and interconnects with City of Brewer's water distribution system for emergency use.

Source of Supply

The source of supply for the Bangor Water is Floods Pond in Otis. The pond lies 15 miles east of Bangor in a rocky, rugged area that was scoured by the retreating glaciers. The pond supplies an excellent source of water that is clear, soft and palatable year-round. Due to the high quality water of Floods Pond, Bangor Water received an exemption from filtration from the Environment Protection Agency in 1991, thus avoiding the cost of nearly $30,000,000 for the construction of a filtration facility. Floods Pond watershed has an area of approximately 8.7 square miles.

The estimated dependable yield of Floods Pond is about 8.2 million gallons per day; we typically pump around four million gallons per day. In order to protect the source of water, Bangor Water originally acquired a strip of land 200 feet wide around the periphery of Floods Pond and Burnt Pond, and in recent years has purchased several thousand additional acres of land in the watershed area to control activities that could impact water quality.

Johnston Pump Station

Johnston Pump Station, located on the shore of Floods Pond, is named after Donald Johnston, a former District superintendent. The station has two 36-inch diameter intake pipes; one is in approximately 13.5 feet of water, and the second is in about 23 feet of water. Four vertical well-type electrically driven 150 hp pumps are on site, each capable of pumping five million gallons per day. From 1957 to 1995, raw water was treated at this pump station.

Butler Ozone Treatment Facility

Beginning in 1995, water treatment was moved to the new Butler Ozone Facility located about a mile from the original station. The water is treated with ozone and chloramines for disinfection, soda ash for pH adjustment, and fluoride for dental health. It is interesting to note that the pond has a natural fluoride content of about 0.20 ppm.

The Butler facility was named for Paul G. Butler of Bangor, who worked a total of 33 years for the City Water Department that then became the Bangor Water District. In addition to serving as chemist and assistant superintendent, Butler was responsible for much of the testing that resulted in Floods Pond being chosen as the source of supply.

Ultra-Violet Treatment Facility

In 2013, an ultra-violet (UV) treatment facility at Floods Pond in Otis was completed and put into service. The additional UV disinfection process is required by federal regulations relating to Cryptosporidium and provides another layer of disinfection protection ensuring safe drinking water.

All facilities have auxiliary generators to ensure lights, heat and pumping facilities during a power failure. The ozone facility is manned by operators 24 hours a day, seven days a week who control water pumpage and treatment, and monitor other Bangor Water storage and pump facilities through a computer network.

Pump Stations and Standpipes

Three pump stations in Bangor are used to control water flow. These are:

- Griffin Road, built in 1987
- Perry Road, built in 1988
- Bangor International Airport, built in 1943, which underwent extensive renovations in 1994. The station is named in honor of Harold Crane of Bangor, a retired 43-year employee and former service truck supervisor.

Water -- totaling 13,250,000 gallons — is stored in six standpipes for daily drawdown and for emergency purposes. These are:

- **Thomas Hill**: holds 1,750,000 gallons and is a riveted wrought iron tank with a wood jacket. It is located on Thomas Hill, rises 50 feet, and is 75 feet in diameter. The tank, built in 1897, is our oldest standpipe. It is a national historic landmark as designated by the Register of Historic Places and the Maine Historic Preservation Commission. It is also designated an American Water Landmark by the American Water Works Association, and a state historic civil engineering landmark by the Maine Chapter of the American Society of Civil Engineers. The lights that illuminate the top at night resemble a queen's crown, in keeping with Bangor being known as the "Queen City."
- **Bomarc**: a welded steel tank located at the former Bomarc base which holds 1,500,000 gallons. This standpipe was constructed in 1986

- **Essex Street:** a concrete tank built in 2010, holding 3,400,000 gallons of water. The new tank replaced a four-million-gallon steel tank constructed in 1958 as well as a two-million-gallon steel tank built in 1933, both of which were demolished.
- **Hammond Street**: a steel welded tank holding 5,000,000 gallons. It stands 74 feet high and is 110 feet in diameter. It was built in 1963.
- **Bangor International Airport**: a 1,000,000-gallon standpipe that stands 100 feet high. It was built in 1944, and is painted in an orange-and-white checkerboard fashion due to its proximity to runways.
- **Hermon**: built in 1999. Holding 600,000 gallons, the standpipe is located on the Coldbrook Road in Hermon and was constructed as part of the Hermon service area expansion.

SCADA System

Operation of pump stations and standpipes, chemical dosing, and monitoring equipment are managed by a System Control and Data Acquisition system (SCADA) computer. A new SCADA system was installed in 2012, to replace the original 1988 model that was no longer supported.

The computer is monitored from the engineering department on State Street in Bangor and at the Butler ozone plant. This SCADA system helps operate our transmission and distribution facilities, and is designed to continue operating in case of power loss. The SCADA system communicates with multiple remote sites that it monitors and operates on a continuous basis. Many other functions such as intrusion alarms, temperature control, etc. are monitored by the SCADA system.

Transmission Lines

Transmission facilities include a 30-inch reinforced pre-stressed concrete pipeline from Floods Pond to the Penobscot River (76,821 feet in length). The main runs along the side of Burnt, Little Burnt, and Snowshoe ponds, and then west to Eddington. At the Penobscot River, the transmission line splits into two 24-inch pre-stressed reinforced concrete mains that pass under the river.

On the west side of the river, the two lines rejoin and form a single 30-inch main which runs to a control valve facility, and on into Bangor.

Customer Service

There are approximately 11,000 service lines (direct water connections) to provide service to approximately 10,500 domestic accounts and 500 fire protection services. Domestic water customers are charged based on the amount of water use measured by a meter. Fire protection is provided through 1119 public hydrants and 220 private hydrants.

Bangor Water also provides water directly to customers in sections of Clifton, Eddington, Hermon, Orrington, Hampden, and Veazie, as well as to the Hampden Water District.

The water provided meets all of the maximum contaminant level requirements of the Safe Drinking Water Act. We monitor the water quality for bacteriological contamination each working day in our certified laboratory to ensure it meets all regulations.

2019 ANNUAL REPORT

BANGOR WATER
BOARD OF TRUSTEES

On behalf of the Board of Trustees, I am pleased to present the 62nd annual report of the Bangor Water District.

At the Board's **annual meeting**, the following officers were chosen: Gerry Palmer, chair; Ralph Foss, vice-chair; and Dan Wellington, clerk. Kathy Moriarty was appointed General Manager and Rachel Bailey was appointed Board Treasurer. Departing Trustee Richard Fournier was recognized for 12 years of service.

Bangor Water was pleased to be named "Water Utility of the Year" for medium-sized utilities by the New England Water Works Association. The award recognizes significant improvements to the water system including a focus on renewing aged infrastructure, upgrading the ozone disinfection system, and increased utilization of technology.

We continued our efforts to move toward a two-mile-per-year pipe replacement goal, ensuring renewal of the water system every 100 years. To that end, the Board approved a rate increase in 2019, fully funding the capital reserve account as allowed by the Maine Public Utilities Commission.

Our minimum charges increased 84 cents per month to $14.74 per month, and our average residential customer's bill increased $1.34 per month to $23.62 per month. Residential customers now use 37 gallons less per day per person than they did 20 years ago.

Among the Board's responsibilities is to review expenses, and electricity (at $250,000 for 2019) is one of the largest budget items. Staff continues to monitor the potential for wind power as part of the Pisgah Mountain development for possible generation of revenue. More recently, we have reviewed information on installation of a **solar panel array** in the Floods Pond watershed. A consultant will help us decide on the feasibility of a project, the various owner vs. lease options, and initial filing of the application and permit paperwork if viable.

The annual **wood harvest** in the Floods Pond watershed took place in the fall of 2019, producing a net revenue of $35,000 from 1324 tons of spruce, hemlock, and white pine. The goal of the harvest is to appropriately manage the forest surrounding Floods Pond with water quality, rather than revenue, being the goal.

Among topics in the news this year were PFAS and microplastics.

- PFAS (perfluoroalkyl and polyfluoroalkyl substances) have been used in industrial applications since the 1950's. Thanks to the isolated nature of Floods Pond and the restricted activities allowed, sources of PFAS have never existed around the lake nor found in the water.
- Microplastics have been found everywhere, including areas generally considered to be pristine. Health impacts are uncertain and current testing methods are expensive. If microplastics were found in Floods Pond, they would have to have been transported by air due to the protected nature of the watershed and the pond.

Infrastructure replacement and equipment upgrades contribute to a reliable potable water system. Major infrastructure projects in 2019 included:

- **Main Street** (Dutton Street to the Hampden town line): joint project with the City of Bangor in advance of resurfacing. Replacement of 3600 feet of c. 1910-1911 water line (as well as 2000 feet of City sewer line). Cost for water portion: $2,000,000.
- **Union Street (West Broadway to I-95) and Fourteenth Street (Ohio to Union)**: replacement of 4,250 feet of c. 1910-1912 water lines in advance of resurfacing. Cost: $2,335,000.
- **Ohio Street** for MDOT bridge replacement: Prep work to suspend water line under new bridge (currently line is buried under I-95). Cost: $75,000.
- **Repair of 33 leaks:** 60 miles or 28 percent of Bangor Water's 200+/- miles of distribution lines are over 100 years old.

Facility improvements included:

- **Butler ozone plant**: began upgrades to the 25-year-old ozone treatment facility which include replacement of ozone generators (used for disinfection), and switching to liquid oxygen for more efficient production of ozone. Piping in a pit was brought above ground to allow easier isolation of equipment as needed. A **fiber optic line** was completed for upgraded communications between the Floods Pond treatment plant and other facilities (standpipes, pump stations).
  Estimated cost: $5,900,000.
- Planning for r**eplacement of 61-year-old private electric line** serving facilities at Floods Pond. Projected cost: $1,000,000.

In closing, I wish to thank the Board members, and the Bangor Water staff on their outstanding efforts in providing high quality and good tasting water to the customers and visitors we serve.

Respectfully submitted,
BANGOR WATER DISTRICT

Gerry Palmer, Chair

2019 ANNUAL REPORT
BANGOR WATER
GENERAL MANAGER

I am pleased to present my annual report as General Manager of the Bangor Water District.

Bangor Water passed the latest round of **sampling for lead and copper** with 2.2 parts per billion for lead (EPA max level is 15 parts per billion) and 0.14 parts per million (EPA max is 1.3 part per million). We have no lead components in our system and there is no lead in the water; lead can be present in buildings with lead soldering in the plumbing or lead in the plumbing fixtures. Bangor Water uses soda ash to control pH levels to reduce the corrosiveness of water and thus reduce lead leaching from plumbing into the water.

With news of six **Legionella** cases in the area, Bangor Water voluntarily conducted sampling in its distribution system. Results showed none was present in the system.

Bangor Water staff members participated in a tabletop exercise simulating a drinking water emergency, aimed at emergency response preparedness. More than 70 attendees participated from 37 different agencies including the hospitals, our neighboring water utilities, our largest water users, the City of Bangor, and various State agencies. Maine Rural Water Associated facilitated the event on our behalf.

Federal legislation that provides funding for utility infrastructure projects requires development of a "risk and resilience" assessment, including a review of potential risks and hazards as well as utility response plans. Bangor Water will utilize a consultant to independently examine its various systems, analyze the potential issues, and develop an updated response plan.

As part of an ongoing commitment to safety, Bangor Water requested a **voluntary safety audit** by SafetyWorks (a part of the Dept. of Labor); the last such inspection was done in 2015. All deficiencies were corrected and monthly department checklists were updated.

Hoping to assist our customers in a pro-active manner, we mailed more than 300 letters to customers whose portion of the water service line may be **galvanized.** The letters warned of the risk of not replacing the galvanized metal ahead of a line collapse, and were sent based on the most recent information we have on the customer's portion of the pipe. (All galvanized sections owned by Bangor Water have been replaced).

Thomas Hill Standpipe tour: During 2019, the surface of the promenade deck was removed, and replaced with new flashing, a membrane deck, and walking pads. The underdrains that move rainfall away from the deck and out of the building were also retrofitted. Cost: $74,300.

The standpipe welcomed visitors for its quarterly tours: spring, 604; summer, 907; fall, 1145; and winter 274.

In closing, I wish to extend my thanks to the Board, our customers, and all of the employees for their continued support during the past 12 months.

Respectfully submitted,
BANGOR WATER DISTRICT

Kathy Moriarty, General Manager

BANGOR WATER

ANNUAL CUSTOMER SERVICE REPORT

	2014	2015	2016	2017	2018	2019
Water Distribution:						
DigSafe requests:	1,231	1,064	1,249	1,171	1,147	1,529
Leaks repaired:	25	29	21	38	23	35
Service/valve boxes repaired:	162	248	303	371	305	347
Number of meter readings collected:	42,510	42,564	41,217	41,400	41,899	43,569
Meters converted to radio read:	642	775	847	555	681	137
Water Quality:						
Total number of BWD samples:	2,904	2,683	2,384	2,170	2,222	2,280
Number of tests performed:	13,283	12,329	11,454	10,770	10,522	10,505
Total number of other utility samples:	524	578	543	516	527	495
Number of tests performed:	1,048	1,154	1,084	1,041	1,065	982
Water quality concerns investigated:	35	37	45	26	37	24
Business Office:						
Number of bills issued:	42,252	43,172	43,327	43,755	43,387	43,368
Amount of BWD water payments processed:	$5,674,115	$5,832,949	$6,191,987	$6,384,888	$6,527,425	$6,978,503
Number of residential late notices mailed	3,760	3,739	2,813	2,704	2,489	2,708
Average amount of overdue residential bill	$58	$58	$69	$67	$60	$71
Number of non-residential late notices mailed	396	446	289	310	297	331
Average amount of overdue non-residential bill	$162	$165	$187	$125	$167	$188
Number of accounts shut off for non-payment	182	146	154	128	105	91

BANGOR WATER

CUSTOMER INFORMATION

PUMPAGE INFORMATION

Number and Classification of Billed Accounts	2014	2015	2016	2017	2018	2019
Residential	8479	8498	8574	8740	8762	8808
Commercial	1467	1469	1356	1492	1494	1489
Governmental	490	492	478	498	497	501
Industrial	16	18	16	15	15	16
Fire Protection	542	540	556	563	575	570
Hampden Water District	3	3	3	3	3	4
	10,997	11,020	10,983	11,311	11,346	11,388

Pumpage (gallons)

January	127,471,000	116,000,000	131,000,000	129,000,000	131,000,000	127,471,000
February	118,912,000	114,000,000	129,000,000	117,000,000	117,000,000	118,912,000
March	128,880,000	135,000,000	129,000,000	136,000,000	127,000,000	128,880,000
April	133,411,000	130,000,000	127,000,000	124,000,000	118,000,000	133,411,000
May	133,197,000	140,000,000	137,000,000	141,000,000	137,000,000	133,197,000
June	134,242,000	136,000,000	142,000,000	141,000,000	143,000,000	134,242,000
July	141,338,000	142,000,000	154,000,000	149,000,000	155,000,000	141,338,000
August	140,228,000	148,000,000	162,000,000	164,000,000	152,000,000	140,228,000
September	131,150,000	139,000,000	141,000,000	144,000,000	137,000,000	131,150,000
October	126,956,000	125,000,000	135,000,000	138,000,000	130,000,000	126,956,000
November	121,139,000	119,000,000	120,000,000	123,000,000	127,000,000	121,139,000
December	117,169,000	124,000,000	132,000,000	121,000,000	128,000,000	117,169,000
	1,554,093,000	1,568,000,000	1,639,000,000	1,627,000,000	1,602,000,000	1,554,093,000
Gals/day	4,257,789	4,295,890	4,490,411	4,457,534	4,389,041	4,246,156