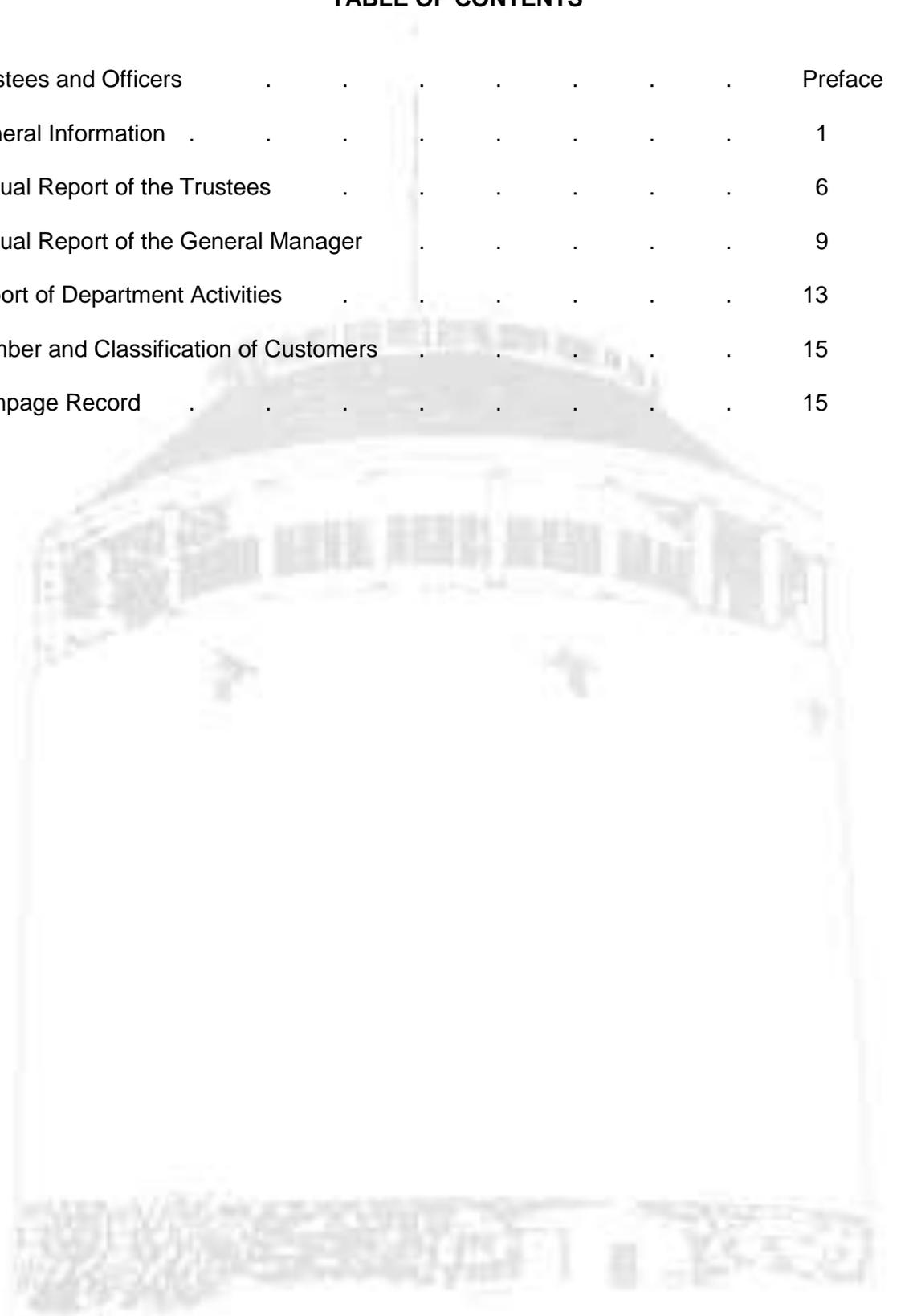


**Fifty-Ninth
Annual Report
of the
Trustees and Officers
of the
BANGOR WATER DISTRICT
Bangor, Maine
for the year ending
December 31, 2016**

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**TRUSTEES OF BANGOR WATER
2016**

Ralph Foss	Term expires 2018
Richard Fournier, chair	Term expires 2017
Patricia Hamilton	Term expires 2019
John Lawler	Term expires 2017
Gerry Palmer, vice-chair	Term expires 2018
Robert Sypitkowski	Term expires 2017
Dan Wellington, clerk	Term expires 2019

**OFFICERS OF BANGOR WATER
2016**

Kathy Moriarty	General Manager
Rachel Bailey	Treasurer

BANGOR WATER General Information

Did you know that

- * Bangor Water pumps and treats approximately 4,500,000 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 almost 60 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

In 1875, Bangor 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 using water from the Penobscot River. Some of these lines are still in service today.

Bangor had experienced typhoid epidemics nearly every year in the late part of the 1800's and early 1900's. The City government appointed a citizen committee to determine the cause of the problem, and during the investigation it noted 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.

Orderly growth 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 70 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. 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--which 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. A 5.5-mile private road runs over the transmission line to the intersection with Rt. 9, at which point the line then runs along Route 9. 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.

2016 ANNUAL REPORT
BANGOR WATER
BOARD OF TRUSTEES

On behalf of the Board of Trustees, I am pleased to present the 59th annual report of the Bangor Water District.

At the Board's **annual meeting**, the following officers were chosen: Rick Fournier, chair; Gerry Palmer, vice-chair, and Dan Wellington, clerk. Kathy Moriarty was appointed General Manager and Rachel Bailey was appointed Board Treasurer.



The Board spent a number of meetings reviewing Bangor Water's recently finalized Capital Improvement Plan (CIP). The plan was completed over three years, and involved a consulting engineering firm to evaluate the utility's entire system. The review included

- Evaluation and assessment of existing
 - treatment and distribution facilities
 - water storage tanks
- Existing and projected water use
- Current and potential regulatory requirements
- Water main assessment and risk analysis

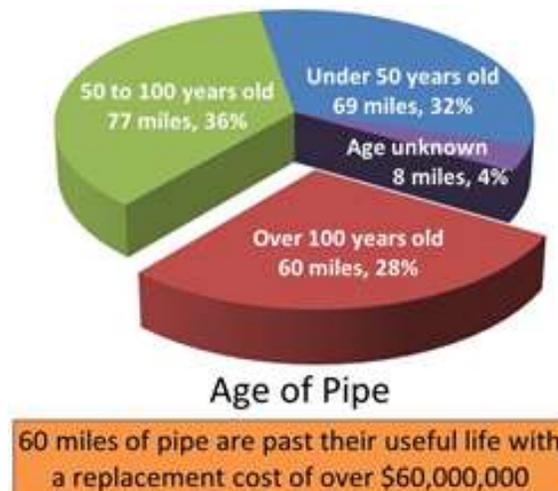
The CIP recommends changes/improvements for the short, intermediate and long term; these will guide staff and Trustees in prioritizing and funding pipe projects, system upgrades, and other items. The goals are to:

- Ensure long-term reliability of the system
- Improve operational efficiencies to develop long-term cost savings
- Ensure optimum water quality and availability of fire protection.

Full implementation of the plan would require more than \$70,000,000 over 20 years, but initial emphasis will be on priorities suggested for the first five years.

With 200 miles of pipe in the ground and an expected 100-year line life span, approximately two miles of pipe should be replaced each year. In 2016, we were able to renew 1.4 miles of pipe. Currently, 28 percent of the pipe is more than 100 years old.

We took another step to address needed infrastructure work by implementing a 4.5 percent **rate increase**. This equated to a 55¢ increase per month for customers with minimum bills, and an 88¢ increase per month for our average residential customers.



Part of the Trustees' job is to balance the needs of system against sustainable rates for our customers, and our current rates are the 20th lowest out of 152 Maine water utilities. Additional rate adjustments will be considered to move Bangor Water closer to a sustainable pipe replacement rate of "two miles per year".



To maintain our exemption to filtration as part of our water treatment, we're required to meet additional criteria including an annual inspection of our watershed at Floods Pond. The on-site visit reviews the treatment facilities' operating procedures and records, equipment maintenance, and protection of the water source. The 2016 report noted Bangor Water "is doing an excellent job of providing safe drinking water, and the watershed inspection shows you are not only meeting but in some instances exceeding" requirements to avoid construction and operation of a filtration plant.

We did not conduct a wood harvest in our watershed area during 2016. The closing of five paper mills in Maine since 2011 has impacted the market for wood products, and Bangor Water's most marketable product going forward will be hardwood. Next year, our forest management plan is due for its 10-year update during which plans for future harvests will be considered. The harvest in 2015 netted \$61,166 toward utility expenses.



During the year, the Board reviewed contracts for electricity supply, treatment supplies, construction materials, paving contractor, and bond attorney to ensure competitiveness.



A dry summer resulted in increased water pumpage and treatment. However, unlike many parts of the country and New England, no water restrictions were required. The level of water at Floods Pond did not fall below the natural outlet of the lake.



Thomas Hill Standpipe is one of our most visible assets, and webcams installed this year in cooperation with a local radio station now stream the view from our promenade deck.

The historic structure continues to draw visitors for our quarterly tours. In 2016, we had 1385 visitors for our spring tour, 830 for our summer tour, 1270 for the fall foliage tour, and 325 who visited with Santa in December.

We partnered with a class from the University of Maine's Innovative Media, Research, and Commercialization Center. Students created video displays related to water that were projected on the side of the standpipe during the May opening.



In closing, I wish to thank the Board members and the utility staff for their efforts on behalf of the Bangor Water and its customers.

Respectfully submitted,
BANGOR WATER DISTRICT

Richard Fournier, Chair

**2016 ANNUAL REPORT
BANGOR WATER
GENERAL MANAGER**

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



Bangor Water conducted its latest round of sampling for lead and copper in June, at homes representing the “worst case scenario” with lead solder and/or lead in plumbing fixtures. The “90th” percentile sample for lead had 4.7 parts per billion (ppb), well below the action level of 15 ppb. The highest result was 8.4 ppb. The 90th percentile sample for copper sampling was 0.15 parts per million (ppm); the action level is 1.30 ppm. The next round of sampling is scheduled for 2019, although possible changes in federal rules might result in earlier sampling.

News items related to testing for lead in school buildings resulted in Bangor Water’s Board and staff members meeting with the City of Bangor School Department. Material on testing and on flushing lines within buildings was provided, and the Department sent letters to parents that included information from Bangor Water.

Staff also sent letters about testing for lead to the 10 other public and private schools directly served by Bangor Water as well as to 47 licensed daycare facilities that are customers.



The mild winter of 2015-2016 resulted in lower heating costs, less plowing of utility facilities, and fewer water main breaks during the winter. However, the pace of leaks returned to normal as the year went on.

Year	Number of leaks	Total Unplanned Cost of Leaks for Year	Average leak cost	Most Expensive Leak	Most Expensive Leak Location
2013	29	\$90,541	\$3,122	\$6,867	14 th St at Francis
2014	21	\$100,219	\$4,772	\$12,799	York at Hancock St
2015	30	\$136,626	\$3,693	\$10,761	Main Street downtown
2016	31	\$159,674	\$5,151	\$47,265	Outer Broadway



In 2016, we renewed 1.4 miles of pipe. Work included:

Street	Location	Length of pipe (feet)	Originally installed	Pipe replaced	Cost	Installed by
Hammond Street	Union St to Ohio St	870	1950	12-inch	\$374,672	Contractor with Bangor Water oversight
Union Street	I-95 to Vermont Ave	2,200	1920	8 and 12-inch replaced with 16-inch	\$836,424	Contractor with Bangor Water oversight
Garland Street Ext		950	1911	8-inch	\$84,832	Relocated for Emera substation (funded by Emera)
Broadway	Center St to Husson Ave	3,350	1915	9 inch replaced with 12-inch	\$1,072,481	Contractor with Bangor Water oversight (work performed at night from May to October)
First Street	At Davis Street			Service lines and hydrants connected to new main installed in 2015	\$192,953	Completion of 2015 project

We also completed upgrades to our c. 1957 main pump station at Floods Pond that included new energy-efficient pumps, new screens at the ends of our intakes, upgraded electrical systems, installation of a new propane generator, and work on the “well compartments” inside the pump station through which the water is drawn in. Work required installation of temporary water intake lines and pumps, and a bypass line around the pump station building. Total project cost was \$4,132,379.



Bangor Water continues to reach out to customers, with an annual newsletter and water quality report. We are also utilizing social media such as Facebook, and a new webpage will replace our current outdated posting in 2017.



During the year, staff achievements were also noted:

- Jeff Faulkner, Maintenance Technician – 15 years
- Troy Hornyak, Crew Supervisor – 15 years
- Randy Moran, Water Treatment Operator – 15 years
- Bob Burke, Director of Water Treatment – 20 years
- Steve Hartery, Lab Technician – 25 years
- Kathy Moriarty, General Manager – 25 years
- Bill Inman, Service Worker – 40 years
- Don Cammack, Construction Supervisor – 45 years
- David Knowles, Service Manager – retired after 33 years of service
- Rick Pershken, District Engineer – resigned after 5 ½ years of service



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 REPORT OF SERVICE,
WATER QUALITY AND BUSINESS OFFICE

**BANGOR WATER
REPORT OF WATER QUALITY, SERVICE, AND BUSINESS OFFICE**

	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>
<u>Water Distribution:</u>					
DigSafe requests:	1349	1,238	1231	1064	1249
Leaks repaired:	20	29	21	30	31
Service/valve boxes repaired:	48	28	162	248	303
Number of meter readings collected:	43,330	43,420	42510	42,564	41,217
Meters converted to radio read:	906	829	642	775	847
New water service projects	42	48	40	72	63
<u>Water Quality:</u>					
Total number of BWD samples:	2,870	2,893	2904	2,683	2,384
Number of tests performed:	12,857	13,638	13283	12,329	11,454
Total number of other utility samples:	590	543	524	578	543
Number of tests performed:	1,180	1,086	1048	1,154	1,084
Water quality concerns investigated:	21	42	35	37	45
<u>Business Office:</u>					
Number of bills issued:	43,031	42,719	42,252	43,172	43,327
Amount of BWD water payments processed:	\$5,638,316	\$5,548,611	\$5,674,115	\$5,832,949	\$6,191,987
Number of residential late notices mailed	3,982	3,976	3,760	3,739	2,813
Average amount of overdue residential bill	\$60	\$62	\$58	\$58	\$69
Number of non-residential late notices mailed	342	482	396	446	289
Average amount of overdue non-residential bill	\$143	\$149	\$162	\$165	\$187
Number of accounts shut off for non-payment	139	122	182	146	154

BANGOR WATER
CUSTOMER INFORMATION

**BANGOR WATER
CUSTOMER INFORMATION**

**Number and Classification
of Billed Accounts**

	2012	2013	2014	2015	2016
Residential	8689	8588	8479	8497	8573
Commercial	1383	1429	1467	1469	1356
Governmental	416	467	490	492	478
Industrial	20	19	16	18	16
Fire Protection	533	531	542	542	556
Hampden Water District	3	3	3	3	3
	11,044	11,037	10,997	11,021	10,982

Pumpage (gallons)

January	128,844,000	128,910,000	127,471,000	116,265,000	131,105,000
February	121,191,000	117,315,000	118,912,000	114,181,000	124,774,000
March	131,623,000	128,031,000	128,880,000	134,996,000	128,883,000
April	124,135,000	129,118,000	133,411,000	130,308,000	127,087,000
May	139,798,000	136,590,000	133,197,000	140,150,000	136,071,000
June	129,226,000	139,989,000	134,242,000	136,223,000	141,282,000
July	153,998,000	144,505,000	141,338,000	141,884,000	152,213,000
August	157,045,000	145,958,000	140,228,000	148,295,000	163,098,000
September	135,862,000	134,654,000	131,150,000	139,312,000	140,135,000
October	139,659,000	136,223,000	126,956,000	125,496,000	132,334,000
November	128,524,000	130,014,000	121,139,000	118,808,000	117,772,000
December	124,317,000	124,716,000	117,169,000	124,270,000	127,324,000
	1,614,222,000	1,596,023,000	1,554,093,000	1,570,188,000	1,622,078,000
Gals/day	4,422,526	4,372,666	4,257,789	4,301,885	4,444,049

