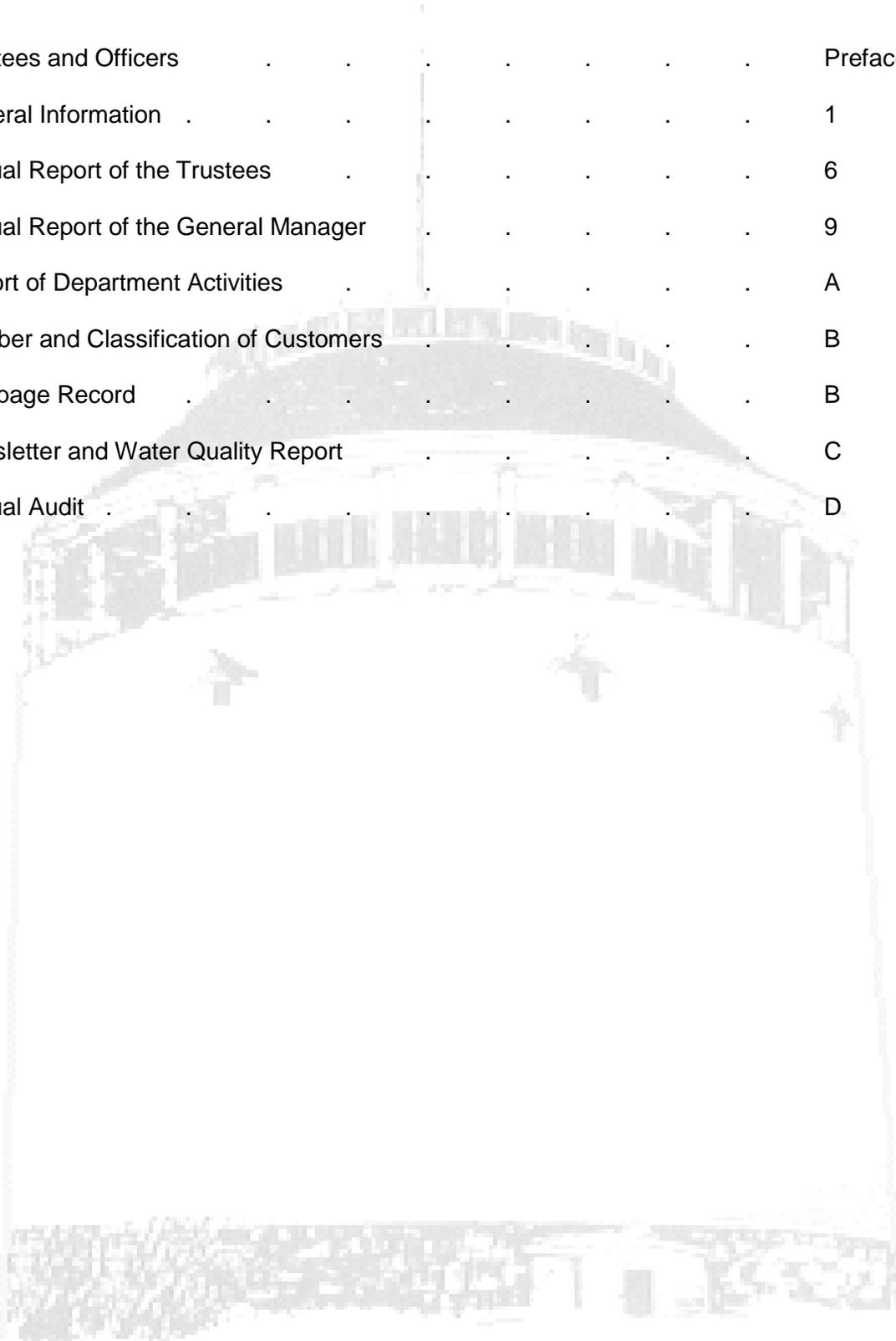


Sixtieth
Annual Report
of the
Trustees and Officers
of the
BANGOR WATER DISTRICT
Bangor, Maine
for the year ending
December 31, 2017

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**TRUSTEES OF BANGOR WATER
2017**

Ralph Foss	Term expires 2018
Richard Fournier, chair	Term expires 2020
Laurel Grosjean	Term expires 2020
Patricia Hamilton	Term expires 2019
John Lawler	Term expires 2020
Gerry Palmer, vice-chair	Term expires 2018
Dan Wellington, clerk	Term expires 2019

**OFFICERS OF BANGOR WATER
2017**

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 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. 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.

2017 ANNUAL REPORT
BANGOR WATER
BOARD OF TRUSTEES

On behalf of the Board of Trustees, I am pleased to present the 60th 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.



Replacement of aging infrastructure and good stewardship of existing resources continue to be among the Board's top priorities. Bangor Water has 200 miles of pipe in the ground; with an expected lifespan of 100 years, we should be replacing two miles of pipe each year to ensure a sustainable system. Currently, about 60 miles of pipe is more than 100 years old. We have begun to move toward that goal, increasing our annual pipe renewal rate from one mile less than five years ago.

Funding for the work comes from a variety of sources. We try to partner with others (City of Bangor, State of Maine, etc.) doing work in the same area; in some cases, the work is bid as a joint project. We also apply for low-interest loans from the state Drinking Water Program's Revolving Loan Fund, as well as issuing bonds. For the past few years, we have begun fully funding a capital reserve account, recently allowed by the Maine Public Utilities Commission strictly to address infrastructure projects.

Keeping water rates affordable (generally considered to be less than 2.5 percent of median household income) is also a Board priority. Our current rates have been in place since 2016.

Penobscot County 2016	
Median annual household income	\$45,302.00
2.5 percent	\$1,132.55
Average annual residential water bill	\$233.96
Average daily residential water cost	\$0.64

We anticipate a rate case in 2017 as we move toward system sustainability.



Monthly review of income and expenses, competitive bidding, and periodic review of contracts are among the ways the Trustees ensure good value. During the year, we

- Approved bids for construction materials, treatment chemicals, grounds maintenance, and paving.
- Asked for proposals to perform our annual audit, and awarded a contract
- Reviewed current worker's compensation insurance, and opted to change carriers for reduced costs
- Opted to replace a 12-year-old plow truck which was unreliable and needed constant repair



To maintain our exemption from construction of a filtration plant, we're required to meet additional criteria including an annual inspection of the watershed at Floods Pond. The on-site visit reviewed the treatment facilities' operating procedures and records, equipment maintenance, and protection of the water supply. The State report received on this fall's inspection indicated that the criteria was not only met but in some cases exceeded requirements.



After a year with no wood harvesting in the watershed, our contractor conducted cutting operations during late summer. The yield of 1580 tons (sustainable annual yield is 1606-2450 tons) netted \$32,000 after expenses.

The Board also reviewed its forestry management plan, aimed primarily at water quality protection with harvest income a secondary consideration. The plan was updated to conform to American Tree Farm certification provisions, sustainability standards, and inventory.

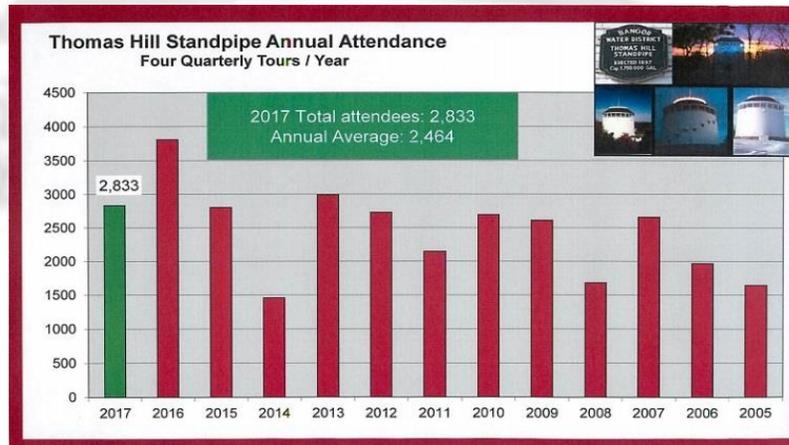
Our existing three-year contract for a forestry management consultant was extended with the same terms for an additional two years. This will bring assessment of the contract into our five-year contract review cycle.



During the year, staff and Trustees met with the Bangor City Council as well as its infrastructure subcommittee to discuss mutual capital improvement planning and possible joint construction work. Cooperation often reduces costs, as well as inconvenience to customers.



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



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

Richard Fournier, Chair

**2017 ANNUAL REPORT
BANGOR WATER
GENERAL MANAGER**

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



We continue to work on projects to address aging infrastructure, often in cooperation with the City of Bangor or other utilities. Among work performed in 2017 were:

WHERE	WHAT	COST
Broadway (State to Cumberland)	Replaced 1650' of c. 1910 6-inch with 12-inch line. Joint project with MDOT and City of Bangor	\$641,000
Hammond (Maine Ave and Odlin Road)	Replaced 2150' of c. 1903-1910 pipe with 12" and 16" pipe. Joint project with MDOT and City of Bangor	\$667,000
Hammond (State St bridge to Ohio St)	Replaced 1201' of c. 1875 and 1912 pipe. Joint project with City of Bangor sewer/stormwater	\$524,000
Columbia Street	Completed transfer of service liens from 6-inch 1927 line to 16-inch 1980's line already in place. Joint project with City of Bangor, other utilities, and road reconstruction.	\$192,000

One of our goals during projects is to keep affected customers as well as the general public informed. We provide public outreach on projects impacting water service or traffic by

- Mailing letters to property owners abutting the project area
- Having an on-site inspector in contact with building occupants
- Holding pre-construction informational meetings on potentially disruptive projects
- Utilizing social media for project updates
- Offering information via the City of Bangor's traffic alert system and/or downtown coordinator

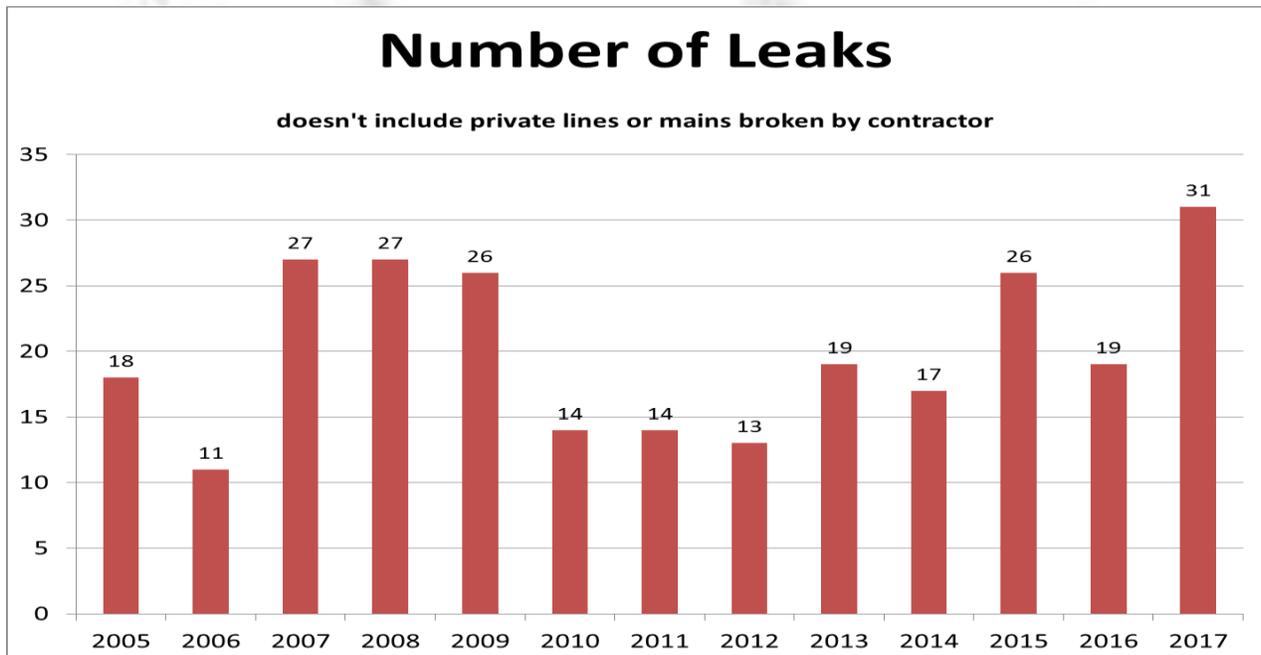


We also have 4,600 valves in our system; of those, we have 238 with known issues. That's not surprising since more than 25 percent of the system is more than 100 years old. A faulty valve can impact leaks or main replacement work, when the shutdown area without water has to expand to the next working valve. In some instances, long sections of pipe were installed years ago without any valves; part of our ongoing system assessment is to determine if long pipe runs should have a valve cut in.

A new "vacuum excavator" allows us to repair many valves without the traditional "open trench" cut. This approach minimizes traffic impact, repair time, and cost (including pavement costs since the excavation site is much smaller).



During 2017, we had 31 leaks; more than sixty percent of the leaks were on lines that are 80 years old or older.





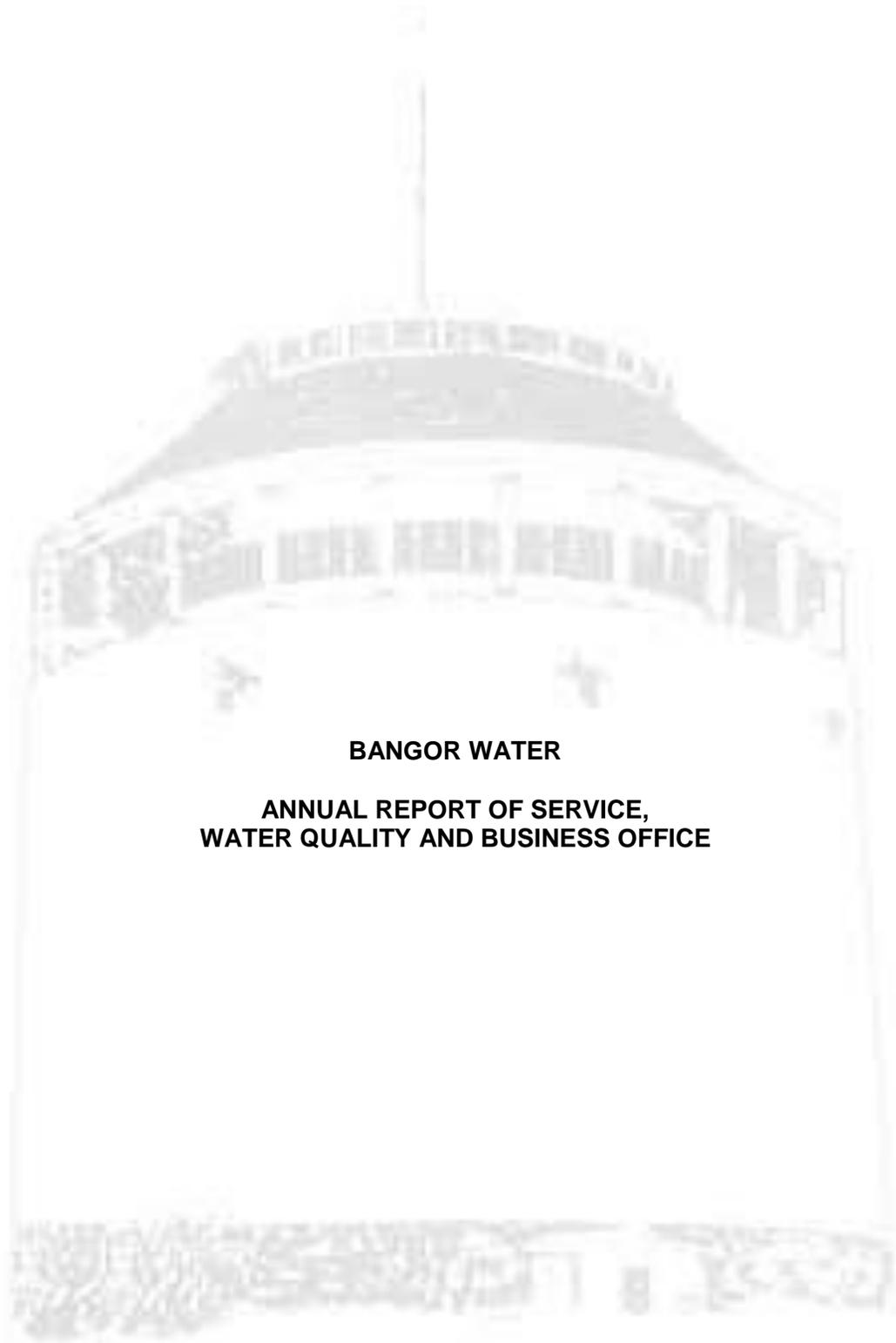
Bangor Water continues to reach out to customers, with an annual newsletter and water quality report, our Facebook page, and our website.



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 DISTRIBUTION, WATER QUALITY & OFFICE**

	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>
<u>Water Distribution</u>					
DigSafe requests:	1,238	1231	1064	1249	1171
Leaks repaired:	19	25	29	21	38
Service/valve boxes repaired:	28	162	248	303	371
Number of meter readings collected:	43,420	42,510	42,564	41,217	41,400
Meters converted to radio read:	829	642	775	847	555
<u>Water Quality:</u>					
Total number of Bangor Water samples:	2,893	2904	2,683	2,384	2,170
Number of tests performed:	13,638	13,283	12,329	11,454	10,770
Total number of other utility samples:	543	524	578	543	516
Number of tests performed:	1,086	1,048	1,154	1,084	1,041
Water quality concerns investigated:	42	35	37	45	26
<u>Business Office:</u>					
Number of bills issued:	42,719	42,252	43,172	43,327	43,755
Amount of water payments processed:	\$5,548,611	\$5,674,115	\$5,832,949	\$6,191,987	\$6,384,888
Number of residential late notices mailed	3,976	3,760	3,739	2,813	2,704
Average amount of overdue residential bill	\$62	\$58	\$58	\$69	\$67
Number of non-residential late notices mailed	482	396	446	289	310
Average amount of overdue non-residential bill	\$149	\$162	\$165	\$187	\$125
Number of accounts shut off for non-payment	122	182	146	154	128



**BANGOR WATER
CUSTOMER INFORMATION**

**BANGOR WATER
CUSTOMER INFORMATION**

**Number and
Classification**

of Billed Accounts	2013	2014	2015	2016	2017
Residential	8588	8479	8497	8573	8621
Commercial	1429	1467	1469	1356	1389
Governmental	467	490	492	478	486
Industrial	19	16	18	16	15
Fire Protection	531	542	542	556	562
Hampden Water District	3	3	3	3	3
	11,037	10,997	11,021	10,982	11,076

Pumpage (gallons)

January	128,910,000	127,471,000	116,265,000	131,105,000	124,981,000
February	117,315,000	118,912,000	114,181,000	124,774,000	114,650,000
March	128,031,000	128,880,000	134,996,000	128,883,000	132,527,000
April	129,118,000	133,411,000	130,308,000	127,087,000	123,634,000
May	136,590,000	133,197,000	140,150,000	136,071,000	137,627,000
June	139,989,000	134,242,000	136,223,000	141,282,000	137,879,000
July	144,505,000	141,338,000	141,884,000	152,213,000	145,560,000
August	145,958,000	140,228,000	148,295,000	163,098,000	160,976,000
September	134,654,000	131,150,000	139,312,000	140,135,000	140,484,000
October	136,223,000	126,956,000	125,496,000	132,334,000	135,227,000
November	130,014,000	121,139,000	118,808,000	117,772,000	120,892,000
December	124,716,000	117,169,000	124,270,000	127,324,000	118,691,000
	1,596,023,000	1,554,093,000	1,570,188,000	1,622,078,000	1,593,128,000
Gals/day	4,372,666	4,257,789	4,301,885	4,444,049	4,364,734



**NEWSLETTER AND
WATER QUALITY REPORT**



ANNUAL AUDIT