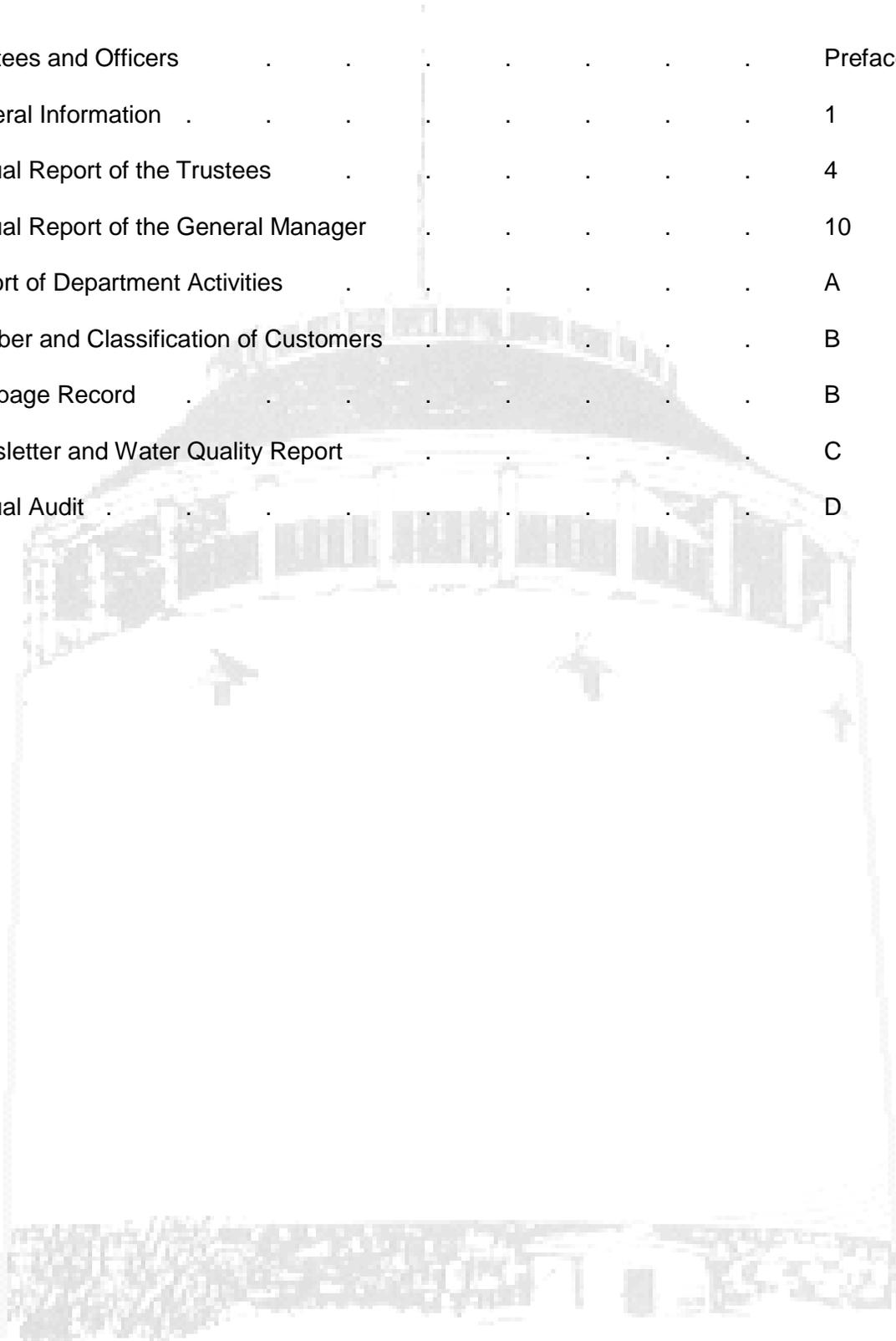


**Sixty-First
Annual Report
of the
Trustees and Officers
of the
BANGOR WATER DISTRICT
Bangor, Maine
for the year ending
December 31, 2018**

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**TRUSTEES OF BANGOR WATER
2018**

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
2018**

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 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

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.

2018 ANNUAL REPORT
BANGOR WATER
BOARD OF TRUSTEES

On behalf of the Board of Trustees, I am pleased to present the 61st annual report of the Bangor Water District.

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



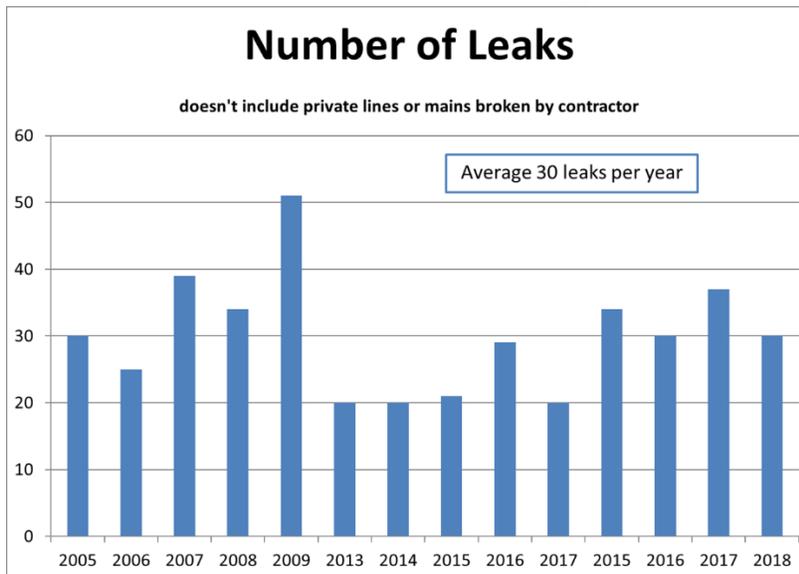
The Board continues to balance infrastructure needs with affordable water rates. A rate increase was approved in 2018, providing monies for projects, fully funding the capital reserve account as allowed by the Maine Public Utilities Commission, and allowing some contingency due to the uncertainty of revenue from the PERC and Fiberight plants. The change increased the average residential water bill by six cents per day.

Affordable rates are generally considered to be less than 2.5 percent of median household income.

Penobscot County 2017	
Median annual household income (US Census Bureau)	\$47,868.00
2.5% (annual utility affordability level established by US EPA)	\$ 1,197.15
Average annual residential water bill – Bangor Water	\$ 267.28
Average daily residential water cost – Bangor Water	\$ 0.73



In 2018, Bangor Water repaired 30 leaks at a total cost of \$153,000. Half of the leaks occurred on lines that were more than 75 years old.



Reliable pumpage and accurate treatment of raw water necessitated several projects at our facilities at Floods Pond.

- Bangor Water began planning for upgrades to its Butler Ozone Treatment Plant (now 24 years old). New equipment will improve reliability and reduce operating and maintenance costs. A consulting engineer helped us determine which type of equipment (and whether a purchase or lease arrangement) would be best, and a construction bid for Phase I was awarded for \$928,000.
- In preparation for the upgrades, a temporary treatment system will be housed nearby. Staff performed site work and constructed the building after contractor bids came in significantly over budget. The system can be used in the future during maintenance work or in an emergency.
- The nearby Johnston Pump Station had all its internal and external doors and windows replaced. The units were original to the 1957 construction, and some customization was required due to the old brick building.



Major infrastructure projects in 2018 included:

WHERE	WHAT	COST
State, Exchange, and French Streets	Replaced 2470 feet of pipe installed 1875-1912. Joint project with City of Bangor sewer/stormwater and road reconstruction.	\$954,709
Hammond Street (Union to Fifth St.)	Replaced 500 feet of pipe installed in 1915 (upsized from eight- to 12-inch). Area of significant water leaks.	\$875,631
Union Street (Hammond to West Broadway)	Replaced 1700 feet of pipe installed in 1920 (upsized from six- to 12-inch). Area of significant water leaks. New waterline installed prior to planned city surface restoration in 2019.	



To maintain our exemption from construction of a filtration plant, Bangor Water is required to meet a list of criteria, including an annual on-site inspection of the watershed, inspection of the disinfection equipment, and review of data records and maintenance programs. This year's inspection did not indicate areas for improvement, and noted that the criteria was not only met but in some cases exceeded requirements.



Our annual forest harvest took place in the Floods Pond watershed during October, on a 99-acre parcel first harvested in 2006; a little more than 4,508 tons netted \$46,026. This year also marks the 10th year that Bangor Water has maintained American Tree Farm certification.



Monthly review of income and expenses, competitive bidding, and established financial protocols are among the way that the Trustees ensure good value. We will experience an 8.6 percent increase in health insurance premiums and a 9.5 percent increase in water treatment supplies in 2019.

During 2018, the Board reviewed and approved a number of policies including:

- Asset capitalization (update)
- Purchasing (update)
- Cash management (new)
- Conflict of interest – Board member (update)
- Conflict of interest – Employee (update)

The Board also approved an updated Cross-Connection Control Program, as suggested during a required inspection by the Department of Health and Human Services (a two-day process every three years).



Security and reliability of our electronic hardware and software is an ongoing concern. We have committed \$35,000 for security upgrades, and another \$104,000 for upgrades to the SCADA system hardware and software.



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

**2018 ANNUAL REPORT
BANGOR WATER
GENERAL MANAGER**

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



In addition to oversight of large piping projects performed by contractors, Bangor Water also completed other infrastructure work.

- Our crew, working with a contractor, decommissioned a pressure-reducing pit on Mount Hope Avenue by removing the valves and replacing them with piping. The pit is no longer used due to changes elsewhere in our system that regulate pressure. The project included installation of a temporary water line around the construction site, pit entry and demolition, installation of new water lines, and removal of the temporary line. Doing the work “in house” saved an estimated \$160,000.
- We also manage small “third part work,” typically service to new buildings or developments, as well as demolition of existing buildings. The oversight varies depending on the project, and might involve plan review, field inspection, observing disinfection and collecting samples, and inputting data to our GIS system. We had 36 projects in four towns, including demolition of seven buildings and installation of 1000+ feet of new private water main.

Municipality	Description	Municipality	Description
Bangor	Multi-unit residential development	Orrington	Two new multi-unit condos
Bangor	New building and parking garage	Bangor	New Car Wash
Orrington	Multi-unit residential development	Bangor	New Single-Family Home
Bangor	Medical Facility	Bangor	Demolish Single-Family Home
Bangor	Bed and Breakfast	Hermon	New Car Wash and Convenience Store
Bangor	Replace Owner's Service Line	Bangor	New Single-Family Home
Bangor	Demolish Commercial Building	Bangor	Demolish Single-Family Home
Bangor	New Medical Facility	Bangor	New Facility with Office Space and Classrooms
Bangor	Demolish Single-Family Home	Orrington	Multi-unit residential development, Phase 2
Bangor	Demolish Single-Family Home	Bangor	New Splash Pad, seasonal.
Bangor	Demolish Single-Family Home	Hermon	New Car Wash
Bangor	Replace broken water service line	Bangor	Replace abandoned 1" service
Bangor	New Single-Family Home	Bangor	Replace leaking valves
Bangor	New Single-Family Home	Bangor	New Laundry/Office/Maintenance Shop
Orrington	New Car Wash and Laundromat	Bangor	Private water main Extension from 2015 project
Bangor	Replace Damaged Service Line	Bangor	Demolish Single-Family Home
Bangor	Service to entertainment facility	Eddington	New water service to small maintenance shop
Bangor	New facility with private water main	Bangor	Convert building to 4-units with fire service



Planning has begun for an evaluation of the water pressure and infrastructure in the area of Bangor International Airport. Two of the standpipes in that area – BIA (1944) and Hammond (1963) – as well as the Crane pump station are at the end of their useful life. Before replacing them, we will review the “big picture” including needed storage, fire flow requirements, operational flexibility, impact on water quality, and system redundancy to see if changes should be made. A consulting engineer will help us sort through the information and assist with recommendations.



It was a year of changes in our work force with three long-term employees (with 133 years of experience among them) retiring; that triggered 17 other changes as a result of current employees moving into existing or redefined positions, as well as new employees coming on board. We also recognized

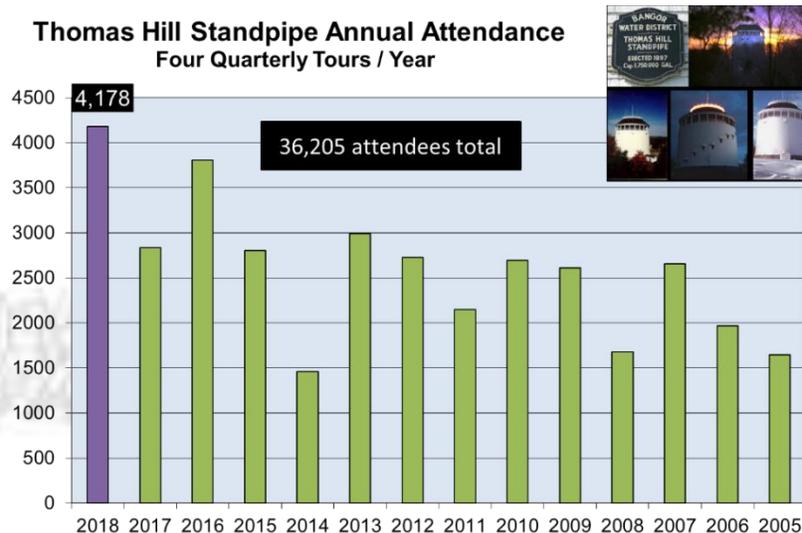
- Merle Moore, service department, for 50 years of service
- Wayne Hachey, water treatment department, for 30 years of service



Communication with the communities we serve continues to be a priority. During the year, we met with the Bangor City Council as well as its infrastructure committee to discuss mutual capital improvement planning and potential joint construction work. Cooperating on projects often reduces both costs and inconvenience to customers.

We also reach out with our annual newsletter and water quality report, our Facebook page, and our website.

Our annual tours of Thomas Hill Standpipe proved very popular this year.

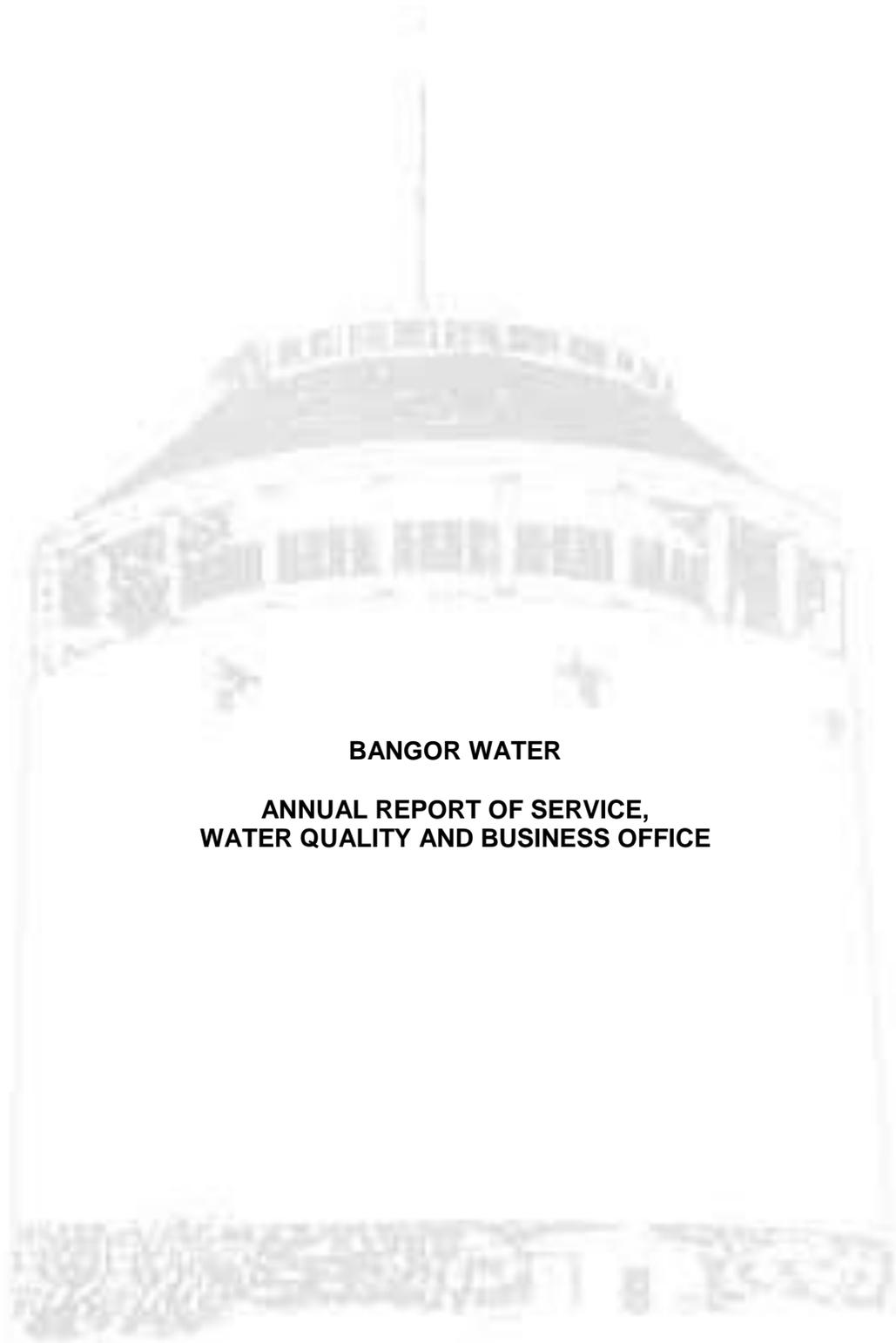


In closing, I wish to extend my thanks to the Board, our customers, and all of the employees for their continued support during the past 12 months.

Respectfully submitted,
BANGOR WATER DISTRICT

Kathy Moriarty, General Manager





BANGOR WATER

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

	<u>2014</u>	<u>2015</u>	<u>2016</u>	<u>2017</u>	<u>2018</u>
<u>Water Distribution:</u>					
DigSafe requests:	1,231	1,064	1,249	1,171	1,147
Leaks repaired:	20	34	30	37	30
Service/valve boxes repaired:	162	248	303	371	305
Number of meter readings collected:	42,510	42,564	41,217	41,400	41,899
Meters converted to radio read:	642	775	847	555	681
<u>Water Quality:</u>					
Total number of BWD samples:	2,904	2,683	2,384	2,170	2,222
Number of tests performed:	13,283	12,329	11,454	10,770	10,522
Total number of other utility samples:	524	578	543	516	527
Number of tests performed:	1048	1,154	1,084	1,041	1,065
Water quality concerns investigated:	35	37	45	26	37
<u>Business Office:</u>					
Number of bills issued:	42,252	43,172	43,327	43,755	43,387
Amount of BWD water payments processed:	\$5,674,115	\$5,832,949	\$6,191,987	\$6,384,888	\$6,527,425
Number of residential late notices mailed:	3,760	3,739	2,813	2,704	2,489
Average amount of overdue residential bill:	\$58	\$58	\$69	\$67	\$60
Number of non-residential late notices mailed:	396	446	289	310	297
Average amount of overdue non-residential bill:	\$162	\$165	\$187	\$125	\$167
Number of accounts shut off for non-payment:	182	146	154	128	105



**BANGOR WATER
CUSTOMER INFORMATION**

**Number and Classification
of Billed Accounts**

	2014	2015	2016	2017	2018
Residential	8,479	8,498	8,574	8,740	8,762
Commercial	1,467	1,469	1,356	1,492	1,494
Governmental	490	492	478	498	497
Industrial	16	18	16	15	15
Fire Protection	542	540	556	563	575
Hampden Water District	3	3	3	3	3
	10,997	11,020	10,983	11,311	11,346

Pumpage (gallons)

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