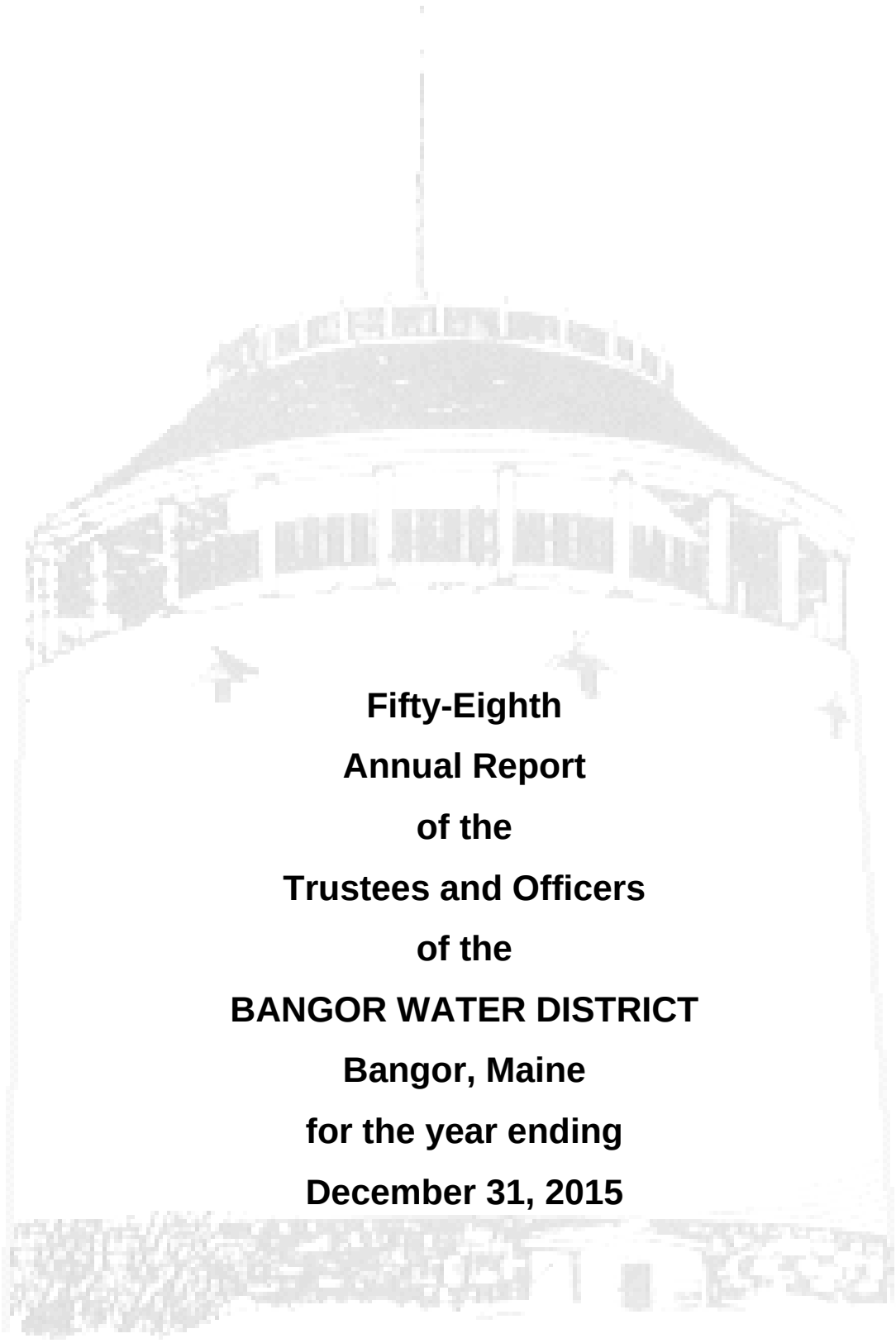


Fifty-Eighth
Annual Report
of the
Trustees and Officers
of the
BANGOR WATER DISTRICT
Bangor, Maine
for the year ending
December 31, 2015

TABLE OF CONTENTS

TRUSTEES OF
BANGOR WATER DISTRICT
2015

Ralph Foss	Term expires 2018
Richard Fournier, vice-chair	Term expires 2017
Patricia Hamilton, chair	Term expires 2016
John Lawler	Term expires 2017
Gerry Palmer	Term expires 2018
Robert Sypitkowski	Term expires 2017
Dan Wellington, clerk	Term expires 2016

OFFICERS OF
BANGOR WATER DISTRICT
2015

Kathy Moriarty	General Manager
Rachel Bailey	Treasurer

BANGOR WATER DISTRICT
General Information

Did you know that

* The District 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.
* The District 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 over 50 years ago.
* The District 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 76,951 feet of water mains to be used for domestic, industrial and fire protection utilizing water from the Penobscot River. Many 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 ascertain the cause of the problem, and during the investigation it was 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 district. In essence, the act authorized the District 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 the District. 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 to place it in a ready state for consumption.

In the ensuing decades, increasingly sophisticated equipment was added to the District's 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, the District 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 facility to control standpipe levels.

In 2002, at the invitation of the Town of Orrington, BWD expanded its existing service area. The Town completed a 3500-foot extension of BWD's line serving 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 District is Floods Pond in Otis. The pond lies 15 miles east of Bangor in a rocky, rugged area which was scoured by the retreating glaciers. The pond supplies an excellent source of water that is clear, soft and palatable year-round. The 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, the District 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 which could impact on 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, chemical dosing was moved to the new Butler Ozone Treatment 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

An ultra-violet (UV) treatment facility at Floods Pond in Otis was completed and put into service in 2013. The additional UV disinfection process is required by federal regulations relating to *Cryptosporidium* and provides a multi-barrier 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 District 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 the District's 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 which 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 which 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 supported by a System Control and Data Acquisition system (SCADA) computer. A new SCADA system was installed in 2012, to replace the original 1988 model which 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 all BWD transmission and distribution facilities, and is designed to continue operating in case of power loss. The SCADA system communicates with multiple remote sites which it monitors and operates on a continuous basis. In the event that all communications are lost, there is a small computer at each pump station designed to allow continued operation. 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. On the east bank of the Penobscot River, the transmission line splits into two 24-inch pre-stressed reinforced concrete mains which pass under the river.

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

Customer Service

There are approximately 11,000 services (direct water connections) which 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.

The District 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. The District monitors the water quality for bacteriological contamination each working day in its own certified laboratory to ensure it meets all regulations.

ANNUAL REPORT

OF THE BOARD OF TRUSTEES

BANGOR WATER DISTRICT
2015

On behalf of the Board of Trustees, I am pleased to present the 58th annual report of the Bangor Water District.

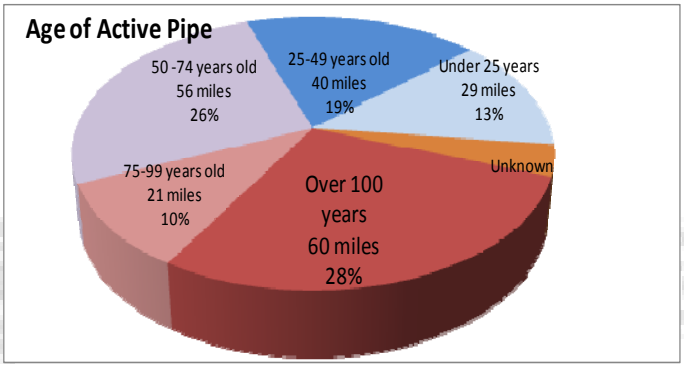
At the Board's **annual meeting**, the following officers were chosen: Patty Hamilton, chair; Richard Fournier, vice-chair, and Dan Wellington, clerk. Kathy Moriarty was appointed General Manager and Rachel Bailey was appointed Board Treasurer.

The District took a first step in addressing sorely needed infrastructure work by implementing a **rate increase** in 2015, the first since 2011. Part of our job is to balance the needs of system against sustainable rates for our customers, and our current rates are the 15th lowest out of 147 Maine water utilities.

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. Currently, 28 percent of the pipe is more than 100 years old and another 36 percent is 50-100 years old.

The monies generated by the rate increase will begin funding an **infrastructure replacement account**, as limited by the Maine Public Utilities Commission. Pipe replacement projects are prioritized based on our "system infrastructure assessment (SIA)," and will be addressed as funding is available.

Additional rate adjustments will be considered to move the District closer to the "two mile per year" goal.



Preventing or **reducing operating expenses** helps stabilize our rates. Even though health insurance rates increased by 9 percent in 2015, a switch in plans in 2013 has saved more than $270,000 to date.

The District also issued bids for its banking services, resulting in low fees and higher returns on investments, and saw the benefit of a 2014 bid process for general insurance (liability, auto, and workers comp).

We keep a close eye on electrical expenses, which at $258,000 is our second largest expense. During 2015, a PAX mixer was installed at the Hermon standpipe to replace an outdated system. The new unit will provide better water conditions as it will circulate the tank year-round, and is estimated to save $30,000 in energy costs over its 20-year life span.

Other ways we **manage expenses** includes partnering with other agencies (such as the City of Bangor or State of Maine Dept. of Transportation) on projects, and by careful management of debt.

We submit projects each year for consideration by the Drinking Water State Revolving Fund, which provides low-interest loans (typically two percent lower than market) as well as grants and loan principal forgiveness.

The **2015 timber harvest** in the Floods Pond watershed produced 2,432 tons of product, with a net revenue of $61,000. The work focused on a 71-acre plot previously harvested in 2000, and was at the upper limit of the “sustainable yield” used as a guide to avoid depletion of the forest protecting the lake.

Thomas Hill Standpipe is one of the District’s most visible assets, and will receive additional exposure with the installation of a webcam by a local broadcasting group. Views from the standpipe will begin streaming in 2016.

The historic structure continues to draw visitors for our quarterly tours. In 2015, we had 719 visitors for our spring tour, 868 for our summer tour, 961 for the fall foliage tour, and 257 who visited with Santa in December.

The District continues to support work done by the University of Maine on the **arctic charr population in Floods Pond.** UMaine monitors the population activity, including tagging of fish and observation of the spawning beds. Due to funding cutbacks at other agencies, the District since 2007 has assisted in funding the University's Floods Pond Student Fellowship. In 2015, BWD contributed $3,600 toward the fellowship; the student recipient conducts research, and reports on the research to the District and Maine IF&W.

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

Respectfully submitted,
BANGOR WATER DISTRICT

Patricia Hamilton, chair

ANNUAL REPORT

OF THE GENERAL MANAGER

BANGOR WATER DISTRICT
2015

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

Our focus on **water infrastructure replacement** continued in 2015, in part due to funding an "infrastructure replacement account" newly allowed by the Maine Public Utilities Commission. This will help water utilities deal with pipe installed both a century ago and with inferior materials during World War II.

Electronic documentation of the District's infrastructure over the past few years has provided information to develop a master plan for ongoing renewal.

Some factors we consider in planning projects are: available funding for work; the age of the pipe or a history of leaks; coordination with other utilities, the municipality and the State, so all work can be accomplished at once; and needed improvements for water quality, such as interconnecting dead-end lines, or for fire flows.

Projects in 2015 included:

- Replacement of 1650 feet of water line (c. 1900) on lower Union Street, in cooperation with the City of Bangor and the Maine Dept. of Transportation, at a cost of $614,000.
- Replacement of 1300 feet of pipe (c. 1900) on First and Davis streets in conjunction with City of Bangor revitalization work, at a cost of $200,000.
- Completion of a multi-year effort to increase fire flows at Bangor International Airport's Polk Street hangars (a project approved by the Bangor Fire Dept. in 2006 although flows were not available). Installation of new pipes and/or rehabilitation of old lines has increased flow by 60 percent.

- Decommissioned 2500 feet of 20-inch pipe behind our facilities on State Street that had experienced multiple leaks. The line was redesigned and replaced with 500 feet of 12-inch line at a cost of $57,400.
- Continued refinement of a master plan which will highlight recommended system improvements, based on a hydraulic model of current and potential system configurations. Among the items being evaluated are amount of water storage, age of water in storage, pressures for fire flows, different storage and/or pump methods, emergency response planning, back-up water (redundant transmission line and/or interconnection to neighboring utilities), and pipe replacement prioritization.

Planning continued for the renovation of Johnston Pump Station at Floods Pond in 2016 at an estimated cost of $4 million. Part of the project will be funded with a $2.6 million loan with a 0.25 percent interest rate through the Maine Drinking Water state revolving loan fund.

The pumping facility was built in 1958, and has remained essentially unchanged while operating around the clock. The upgrade will include replacement of antiquated inefficient pumps, replacement and relocation of electrical equipment, installation of new screens on the water intake lines, purchase of a new generator, and redesign of the "wet wells" through which the water flows.

We will also reconstruct an area at the Butler Ozone Plant, bringing a “pit” above ground to make maintenance issues easier to address.

The District experienced more leaks than normal in 2015, due in part to a difficult winter; more than two-thirds occurred during January, February, and March.

LEAKS	Mains	Services	Private or broken by contractor	Hydrants	Valves	Tapping or repair sleeve	Unplanned Costs of Repair	Max Cost Location
2011	14	3	5	0	2	0	$ 78,645	Main St 6”
2012	13	2	10	1	2	3		Garland St 20”
2013	19	3	1	3	3	1	$ 90,541	14th Street 6”
2014	17	1	7	0	1	1	$100,219	York Street
2015	26	3	3	0	3	2	$136,626	Main Street

The District continued sampling from customers’ faucets as required for compliance with **lead and copper regulations**. Again in 2015, samples showed lead levels below the “action level” set by federal rules, which indicates that our corrosion control pilot project is effective. The project focuses on reducing corrosivity of the water by adding soda ash and carbon dioxide to the treatment process. The Maine Drinking Water Program has noted that Bangor Water is in full compliance with Lead and Copper Rule.

There are no known lead components in the District’s system and no lead has been detected in water in our mains. Elevated levels of lead are the result of leeching from customers’ internal plumbing such as lead solder or fixtures such as faucets made with lead components. Until 2014, faucets, fittings, and valves sold in the US could contain up to 8% lead; a new rule now requires no more than 0.25% lead.

To maintain our exemption from filtration as part of our water treatment, our watershed is inspected at regular intervals. The 2015 report indicated “no areas for improvement. BWD is doing an excellent job of providing safe drinking water, and the watershed inspection show you are not only meeting, but in some instances exceeding” the requirements.

As part of our pro-active approach to safety, we hosted Safetyworks (a consultant to the Dept. of Labor) to assess needed improvements (equipment, processes, documentation). Deficiencies were assigned to department heads for resolution, and a follow-up report was returned to Safetyworks by the District.

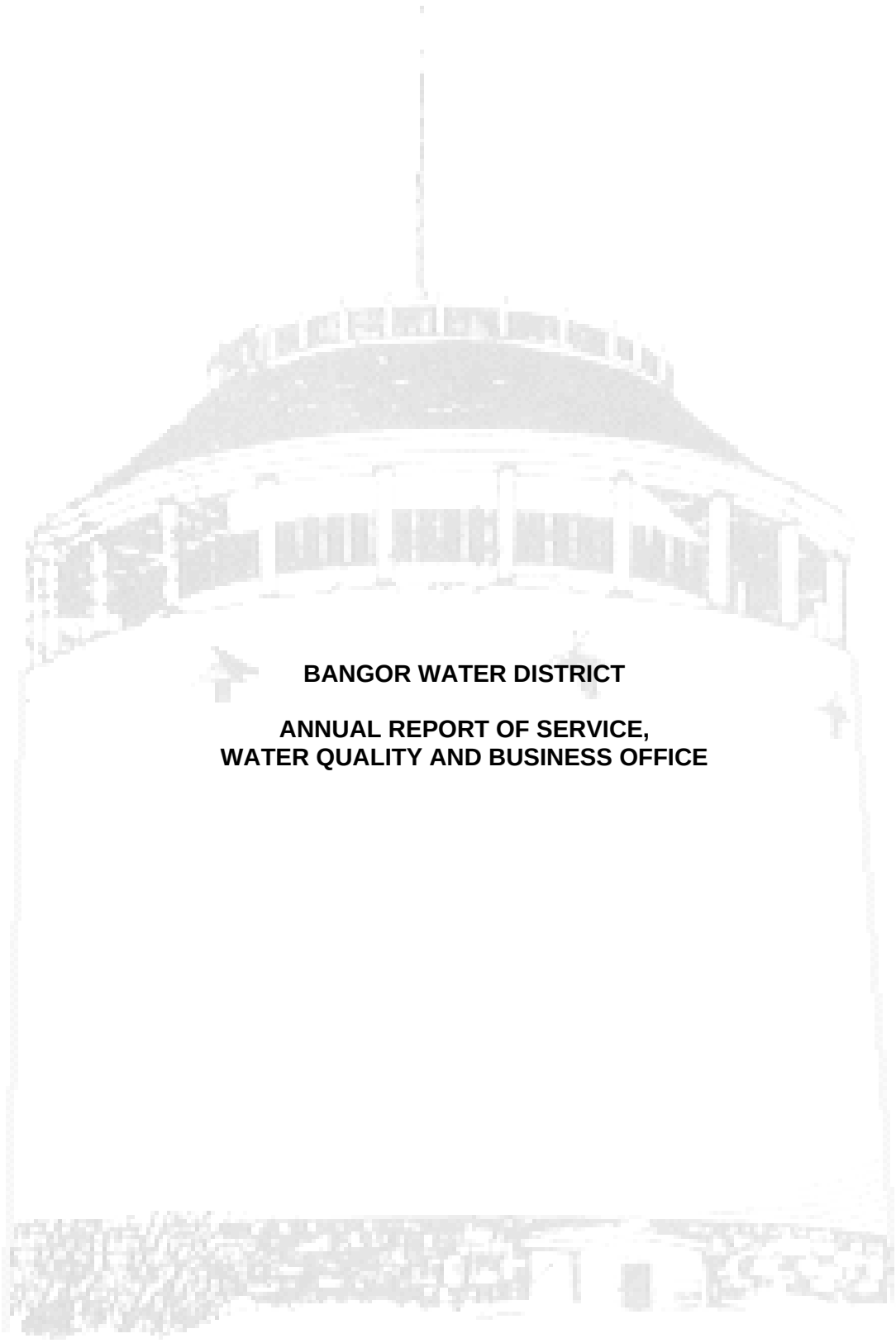
During the year, staff also:

- Met with reps from Bangor High School to discussion expansion of a proposed program to produce water and wastewater treatment operators.
- Recognized several staff members for their service
    - Service worker Cal McKay and Office Manager Kim Marchegiani for 30 years, and Billing Clerk Mary Lawrence for 15 years.
- Created and mailed the annual newsletter and water quality report

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

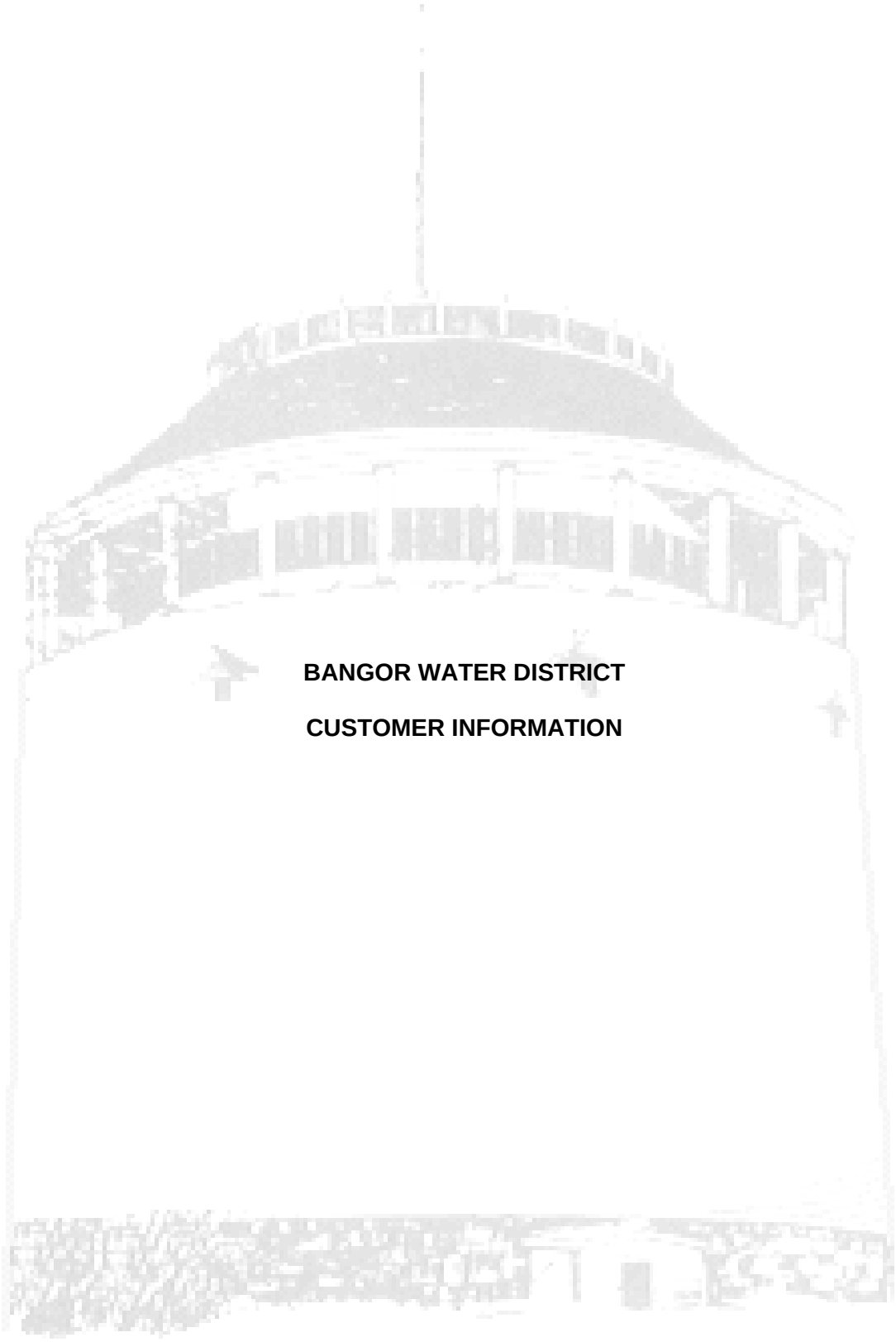


BANGOR WATER DISTRICT

ANNUAL REPORT OF SERVICE, WATER QUALITY AND BUSINESS OFFICE

REPORT OF WATER QUALITY, SERVICE, AND BUSINESS OFFICE

	2011	2012	2013	2014	2015
Water Distribution:					
DigSafe requests:	1187	1349	1,238	1231	1064
Leaks repaired:	14	20	19	25	29
Service/valve boxes repaired:	18	48	28	162	248
Number of meter readings collected:	44,270	43,330	43,420	42510	42,564
Meters converted to radio read:	733	906	829	642	775
Water Quality:					
Total number of BWD samples:	2,608	2,870	2,893	2904	2,683
Number of tests performed:	11,613	12,857	13,638	13283	12,329
Total number of other utility samples:	644	590	543	524	578
Number of tests performed:	1,289	1,180	1,086	1048	1,154
Water quality concerns investigated:	27	21	42	35	37
Business Office:					
Number of bills issued:	42,913	43,031	42,719	42252	43,172
Amount of BWD water payments processed:	$5,052,854	$5,638,316	$5,548,611	$5,674,115	$5,832,949
Amount of water payments collected by City of Bangor sewer department	$162,548	$149,346	$40,765	$0	$0
Amount of sewer payments collected by Bangor Water District	$2,858,111	$2,944,825	$887,944	$0	$0
Number of residential late notices mailed	3,996	3,982	3,976	3,760	3,739
Average amount of overdue residential bill	$55	$60	$62	$58	$58
Number of non-residential late notices mailed	372	342	482	396	446
Average amount of overdue non-residential bill	$147	$143	$149	$162	$165
Number of accounts shut off for non-payment	102	139	122	182	146



BANGOR WATER DISTRICT

CUSTOMER INFORMATION

BANGOR WATER DISTRICT

CUSTOMER INFORMATION

Number and Classification of Billed Accounts	2011	2012	2013	2014	2015
Residential	8603	8689	8588	8479	8497
Commercial	1426	1383	1429	1467	1469
Governmental	462	416	467	490	492
Industrial	19	20	19	16	18
Fire Protection	530	533	531	542	542
Hampden Water District	3	3	3	3	3
	11,043	11,044	11,037	10,997	11,021

Pumpage (gallons)

January	125,213,000	128,844,000	128,910,000	127,471,000	116,265,000
February	117,325,000	121,191,000	117,315,000	118,912,000	114,181,000
March	129,185,000	131,623,000	128,031,000	128,880,000	134,996,000
April	124,238,000	124,135,000	129,118,000	133,411,000	130,308,000
May	132,900,000	139,798,000	136,590,000	133,197,000	140,150,000
June	145,488,000	129,226,000	139,989,000	134,242,000	136,223,000
July	151,996,000	153,998,000	144,505,000	141,338,000	141,884,000
August	142,980,000	157,045,000	145,958,000	140,228,000	148,295,000
September	135,105,000	135,862,000	134,654,000	131,150,000	139,312,000
October	134,069,000	139,659,000	136,223,000	126,956,000	125,496,000
November	127,022,000	128,524,000	130,014,000	121,139,000	118,808,000
December	128,846,000	124,317,000	124,716,000	117,169,000	124,270,000
	1,594,367,000	1,614,222,000	1,596,023,000	1,554,093,000	1,570,188,000
Gals/day	4,368,129	4,422,526	4,372,666	4,257,789	4,301,885