SEWERAGE & WATER BOARD OF NEW ORLEANS
REPORT TO CITY COUNCIL OF NEW ORLEANS

MARCH 13, 2018

A. In compliance with Louisiana R.S. 33:4091, Sewerage and Water Board of New Orleans (the "**Board**") submits this summary and the following attachments, which are incorporated by reference herein:

1) **Attachment A** – Emergency Contracts Resulting from Winter Storm Inga
2) **Attachment B** - LA 33:4087 regarding Local Hiring Preference for SWB Contractors
3) **Attachment C** – Quality Water Report and Water Audit
4) **Attachment D** – DPW-SWB Capital Improvement Program
5) **Attachment E** – Report on Efficiency and Effectiveness of Information Systems
6) **Attachment F** – Black and Veatch Report on Operations
7) **Attachment G** – Tracking Tool for Commitments to City Council
8) **Attachment H** – SWB Capital Projects

B. IN ADDITION TO THE REQUIREMENTS OF SUBSECTION A OF [33:4091(A)], THE BOARD SHALL REPORT QUARTERLY, IN SEPTEMBER, DECEMBER, MARCH, AND JUNE, TO THE CITY COUNCIL RELATIVE TO THE CONTRACTS LET IN THE CONSTRUCTION AND REPAIR OF ITS PUBLIC SYSTEMS OF WATER, SEWERAGE, AND DRAINAGE.

In accordance with Louisiana R.S. 33:4091(B), the Board provides the following responses and attachments, which are incorporated by reference into this report.

(1) The total number of contracts let to all contractors.

The following Contract Renewals were recommended by the General Superintendent and/or approved by the Board of Directors of the Sewerage and Water Board:

1. First and Final Renewal of Contract 30203 – Restoration Gravity Flow Sanitary Sewers By Point Repair of Sewer Mains at Various Sites Throughout the City of New Orleans – Contract

Value $1,933,496.00; DBE Participation Projected: 20.991% ($405,860.14)

2. First and Final Renewal of Contract 30204 – Restoration of Existing Gravity Flow Sanitary Sewers by Excavation and Replacement from Manhole to Manhole, CIPP Lining from Manhole to Manhole, CIP Lining of Service Laterals and Point Repair at Various Sites Throughout the City of New Orleans – Contract Value: $3,988,738.00; DBE Participation Projected: 31.27% ($1,247, 278.37)

The following <u>Contracts</u> were recommended by the General Superintendent and/or approved by the Board of Directors of the Sewerage and Water Board:

Contract to Provide Design and Engineering Services for DPS #4 Canopy and Bridge Crane Addition Value: $308,305.00; DBE Participation Projected: Goal 35% ($107,906.75)

Contract #1402 – Removal of Silt from the new River Intake Station Value: $100,050.00; DBE Goal 0%*

Contract 3986 – Ninth Ward Area Sewer Rehabilitation No. 5 – Contract Value: $852,980.40; DBE Participation Projected: 30% ($255,894.12)

Contract for Furnishing of Sodium Hypochlorite – Req. AL170041 Contract Value: 1,663,200.00; DBE Participation Goal 0%*

Contract for Furnishing Lime to the Carrollton Water Plant – Req. CM170040 Value: $642,775.00; DBE Goal 0%*

Contract for Furnishing Liquid Polyphosphate to the Carrollton Water Plant – Req. No. CM170041 Value: $227,600; DBE Goal 0%*

Entergy Agreement - Florida Ave Phase IV Relocation Value: $5,000,000.00; DBE 0%*

Contract No. 8155 – Building Renovation for Carrollton Water Plant Engineering Building Value: $443,000.00; DBE Participation Projected: 35% ($155,050.00)

Contract for Purchase of Oil Dehydrator-Filter Units for Facility Maintenance Contract Value $151,000.00; DBE Goal 0%*

Contract for Furnishing Liquid Polyphosphate Contract Value: $277,600.00; DBE Goal 0%*

Contract for Phase Two-Replacement of Motor Control Centers F&G Contract Value: $969,000.00; DBE Goal 0%*

Contract for Carrollton Water Plant Electrical Room Renovation Contract Value $378,000.00; DBE Goal 0%*

Contract for Removing Silt from the New River Intake Contract Value: $100,050.00; DBE Participation: Goal 0%*

Contract for Furnishing Safety Supplies Contract Value $124,668.85; DBE Participation Projected: 100% ($124,668.85)

Contract for Furnishing Paper Products and Janitorial Supplies Contract Value: $70,543.50; DBE Participation Projected: 100% ($70,543.50)

The following is a list of all <u>Change Orders or Amendments</u> approved by the Board of Directors for the reporting period of December 1, 2017 through February 28, 2018:

Change Order No. 12, Final Acceptance and Closeout of Contract #1351 – Hurricane Katrina Related Repairs to A&B Pumps and Auxiliaries at the Carrollton Water Purification Plant/ Power Complex Contract Value: $116,221.16 DBE Participation Projected: 6.4% ($7,438.15)

Change Order No. 6, Final Acceptance and Closeout for Contract #2105 – Line Replacement of Mains Damage by Hurricane Katrina within the Central Business District and French Quarter Contract Value: $1,146.808.36; DBE Participation Projected: 56% ($642,212.68)

Change Order No. 1 for Requisition Co 17-0014 Emergency Repairs of Turbine #5 at the Carrollton Water Plant Value: $824,962.80; DBE Goal 0%*

Contract Amendment No. 1 to the Agreement Between The Sewerage and Water Board of New Orleans and Veolia Water North America-South, LLC for Emergency Professional Agreement for Facilities Condition Assessment Value: $2,766,971.00; DBE Participation Projected: 10% ($276,697.10)

Contract Amendment No. 1 to the Agreement Between The Sewerage & Water Board of New Orleans and New Orleans and CH2M Hill Engineers, INC. for Emergency Program management and Staff Augmentation of Operations Maintenance and Recovery Value: $5,489,840.00; DBE Participation Projected: 10% ($558,984.00)

Change Order #3, and Final Acceptance and Closeout for Contract No. 3986, Ninth Ward area Sewer Rehabilitation, Sewer Rehabilitation No. 5 Value: $852,980.40; DBE Participation Projected: 30% ($255,894.12)

Amendment No. 3 to the Agreement between the Sewerage & Water Board of New Orleans and G.E.C., Inc. for Hurricane Katrina Related Drainage Restoration – Broad Underpass Pump Station Design Value: $57,000.00; DBE Participation Projected: 36% ($20,520.00)

Amendment No. 10 to the Agreement between the Sewerage and Water Board of New Orleans and Waldemar S. Nelson and Company for Hurricane Katrina Related Water Restoration Projects Value: $828,400.00; DBE Participation Projected: 12% ($99,408.00)

Change Order No. 12 and Final Acceptance Closeout for Contract No. 3669 – 404 Hazard Mitigation Grant Program - #6 Sewage Pumping Station Value: $126,098.62; DBE Participation Projected: 29.62% ($37,350.41)

Change Order No. 1 for Contract No. 1368 – Hazard Mitigation Grant Project Oak Street Pumping Station Value: $1,303,043.27; DBE Participation Projected: 11% ($143,334.76)

(2) The total <u>value</u> of contracts let to all contractors.

- $30,743,332.40 total value of all contractors.

* <u>*NOTE*</u>: $10,334,237.80 total value of contracts where the DBE team determined there was no ready, willing and able DBE available for contract.

** <u>*NOTE*</u>: In addition to the contracts above, an additional four (4) emergency contracts were let following the Winter Storm Inga, totaling $**<u>3,893,341.00</u>**. *See Attachment A for additional detail*.

(3)(a) The total number of contracts let to local disadvantaged business enterprises expressed as a percentage of the total number of contracts let.

- 21.6%

(***b) The total number of contracts let to local businesses expressed as a percentage of the total number of contracts let.***

- Pursuant to the requirements set forth in RS 38:2225, all of the contracts let during the reporting period were let to contractors with business establishments in the State of Louisiana. This statute expressly prohibits Sewerage and Water Board from requiring a preference for Orleans Parish contractors. However, Sewerage and Water Board is in the process of developing a system of tracking Orleans Parish contractors as requested by the Council and shall comply with Title 33, Section 4087 regarding contractors giving hiring priority to Orleans Parish residents for Sewerage and Water Board contracts on a going forward basis. See *Attachment B* for the full text of LA R.S. 38:2225 and LA R.S. 33:4087.

(4)(a) The total value of contracts let to local disadvantaged business enterprises expressed as a percentage of the total value of contracts let.

- $4,409,040.95

(b) The total value of contracts let to local businesses expressed as a percentage of the total value of contracts let.

- Pursuant to the requirements set forth in RS 38:2225, all of the contracts let during the reporting period were let to contractors with business establishments in the State of Louisiana. This statute expressly prohibits Sewerage and Water Board from requiring a preference for Orleans Parish contractors. However, Sewerage and Water Board is in the process of developing a system of tracking Orleans Parish contractors as requested by the Council and shall comply with Title 33, Section 4087 regarding contractors giving hiring priority to Orleans Parish residents for Sewerage and Water Board contracts on a going forward basis. See *Attachment B* for the full text of LA R.S. 38:2225 and LA R.S. 33:4087.

(5) The total number of contracts let to a fifty-fifty joint venture enterprise expressed as a percentage of the total number of contracts let.

- The Board has not let any joint venture (50/50) enterprise contracts.

C. IN ADDITION TO THE REQUIREMENTS OF SUBSECTIONS A AND B OF [33:4091(A)], THE BOARD SHALL REPORT QUARTERLY, IN SEPTEMBER, DECEMBER, MARCH, AND JUNE, TO THE CITY COUNCIL RELATIVE TO ITS OPERATIONS.

In accordance with Louisiana R.S. 33:4091(C), the Board provides the following responses and attachments, which are incorporated by reference into this report.

(1) Standard industry metrics for best practice, including but not limited to:

(a) Percentage of water loss.

(b) Percentage of water paid.

(c) Percentage of receivables outstanding, including delinquency schedule.

(d) Customer service improvements.

- See attached 2016 Quality Water Report attached hereto as *Attachment C,* which provides a state of tap water in New Orleans including sources, treatment, benchmarks, and compliance monitoring.

(2) Processes and indicators for prevention of waste or fraud.

- The Board's Internal Audit team is charged with detecting and preventing fraud, testing internal controls, and monitoring compliance with Board policy and applicable local, state and federal laws, rules and regulations. In addition, the Board engages on an annual basis, an independent auditor to conduct a full audit of all operations.

(3) Performance metrics for employees and contractors.

- Performance metrics for employees vary by position and department. All employees are reviewed annually in accordance with Civil Service requirements. In addition, general policies and procedures regarding responsibilities of employment with the Board are set forth in the Board's handbook.

- Performance metrics for contractors vary and are set forth in the terms and conditions of each contract.

(**4) Benchmarks of success regarding improved coordination between the Board and the Department of Public Works to ensure priority and resource alignment.**

- See Joint DPW-SWB Capital Improvement Program summary attached hereto as *Attachment D*.

(5) Report on the efficiency and effectiveness of information systems.

- See Report on Efficiency and Effectiveness of Information Systems, dated December 2017 attached hereto as *Attachment E.*

(6) Detailed reports on assessment and status of technologies and operation programs and strategies for system redundancy and service improvements.

- See Draft Report by Black and Veatch on Operations for 2016 attached hereto as *Attachment F.*

(7) Detailed reports on assessment and status of operational reforms, capital improvement programs, and service assurance programs.

- See Tracking Tool for Commitments to City Council attached hereto as *Attachment G*. See Capital Projects overview for 2010 to 2022 attached hereto as *Attachment H*.

Emergency Point Repair Contracts – Freeze Emergency
January 2018 Winter Storm Inga

Contractor	DBE Goal	Summary of Scope	Not-to-exceed amount
GRADY CRAWFORD CONSTRUCTION COMPANY P.O. Box 967 Baton Rouge, LA 70821	*SWB DBE Goal*: 36% *Contractor Stated Commitment*: Not provided.	• Water main point repair • Water service connection at various sites • Water valve and fire hydrant replacement at various sites	$1,117,409.00
BOH BROTHERS CONSTRUCTION 730 South Tonti Street New Orleans, Louisiana 70119 ***DBEs*** Trucking Innovation, LLC, P.O. Box 770725 New Orleans, LA 70177 (5.25%) J. Brown Construction, LLC 182 W. 3rd Street, Bldg B, Kenner, LA 70062 (11.78%)	*SWB DBE Goal*: 36% *Contractor Stated Commitment*: 17.01%	• Water main point repair • Water service connection at various sites • Water valve and fire hydrant replacement at various sites	$1,172,290.00
WALLACE C. DRENNAN, INC. P.O. Box 15438 New Orleans, LA 70119	*SWB DBE Goal*: 36% *Contractor Stated Commitment*: Not provided	• Water main point repair • Water service connection at various sites • Water valve and fire hydrant replacement at various sites	$720,142.00
FLEMING CONSTRUCTION CO. 23 East Airline Drive Kenner, LA 70062 ***DBEs*** F.P. Richard Construction, LLC d/b/a RUE Contractors, 4425 Kawanee Avenue, Metairie, LA 70006 (14.71%) Cooper Contracting Group, LLC, 215 N. Von Braun Court, Harvey, LA 70058 (22.64%)	*SWB DBE Goal*: 36% *Contractor Stated Commitment*: Not provided	• Water main point repair • Water service connection at various sites • Water valve and fire hydrant replacement at various sites	$883,500.00
		TOTAL ESTIMATED NOT-TO-EXCEED AMOUNT:	**$3,893,341.00**

RS 38:2225

§2225. Preference in letting contracts for public work

A. If a nonresident contractor bidding on public work in the state of Louisiana is domiciled in a state that provides a percentage preference in favor of contractors domiciled in that state over Louisiana resident contractors for the same type of work, then every Louisiana resident contractor shall be granted the same preference over contractors domiciled in the other state favoring contractors domiciled therein whenever the nonresident contractor bids on public work in Louisiana.

B. Any local law, either by legislative act or otherwise, ordinance, or executive order enacted prior to the effective date of this Act, or enacted hereinafter in conflict with this Section, or granting any local contractor or subcontractor preference over other Louisiana resident contractors shall be contrary to the provision of this Section.

C. The Department of Transportation and Development and the office of facility planning and control within the division of administration shall keep on file a list of all states with a bid preference.

D. The provisions and requirements of this Section shall not be waived by any public entity.

Acts 1983, No. 43, §1, eff. June 17, 1983. Acts 1984, No. 894, §2; Acts 2014, No. 759, §1.

"RE-BUILDING THE CITY'S WATER SYSTEMS FOR THE 21ST CENTURY"

Sewerage & Water Board OF NEW ORLEANS

MITCHELL J. LANDRIEU, President
SCOTT JACOBS, President Pro-Tem
CEDRIC S. GRANT, Executive Director

625 ST. JOSEPH STREET
NEW ORLEANS, LA 70165 • 504-529-2837 OR 52-WATER
www.swbno.org

Date: June, 2017

To: Sewerage and Water Board Customers

From: Lisa Martin

Deputy Director of Communications

Re: Water Quality 2016 Report

Every Sewerage and Water Board customer will receive an informational insert in their water bill advising them that their drinking water, supplied by the Sewerage and Water Board of New Orleans, is of the highest quality. It also describes the water treatment process. The mailer is called 2016 Report of the State of Tap Water in New Orleans "Quality Water 2016."

This is the 19th time the Board has distributed this Consumer Confidence Report. It is a requirement of the U. S. Environmental Protection Agency (EPA) and must be mailed to all customers once a year, advertised in the Times-Picayune newspaper, posted on the Board's website and be available at government offices and libraries.

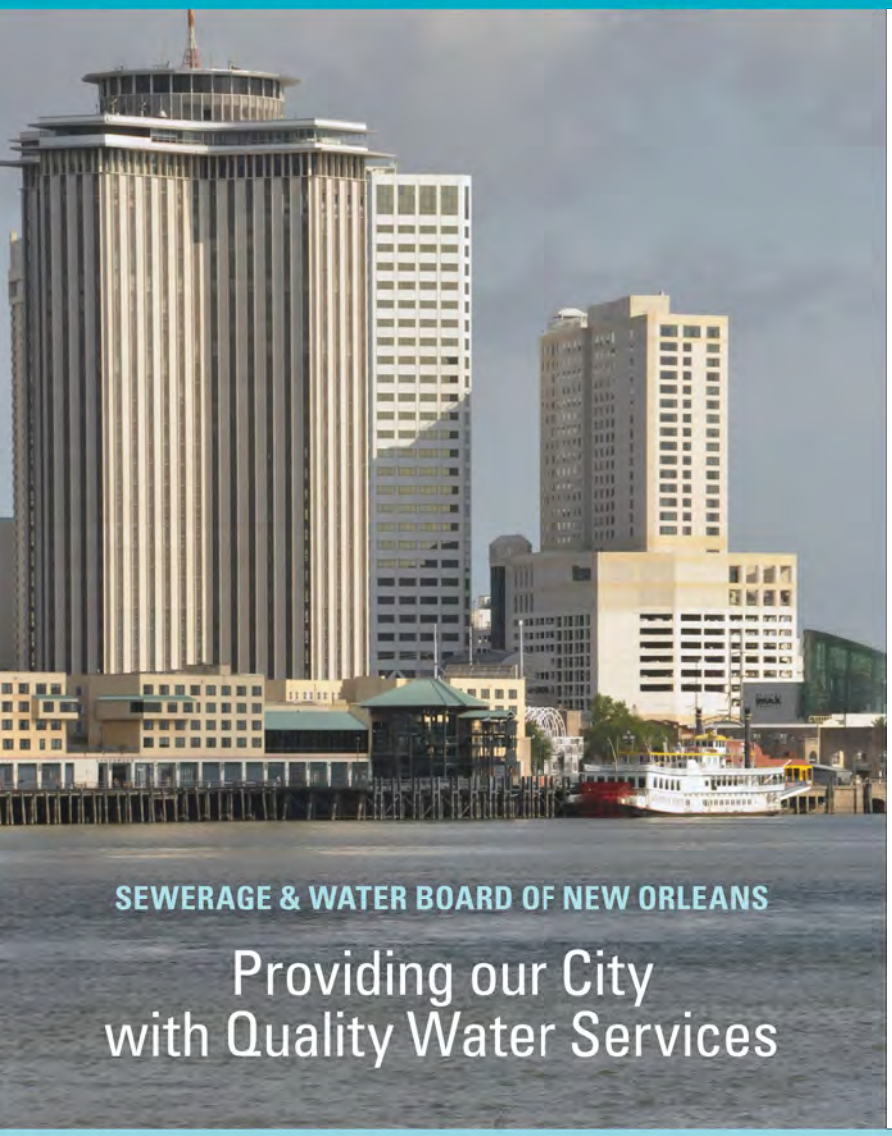
It is named "Quality Water 2016" because all of the water tests results are from 2016. You may have some questions, simply because the report is technical in nature and many chemical names and terms are used. While we would have liked to make it simpler, most of the wording used (including the names of all the chemical compounds) is required by the EPA.

If you have any questions that are technical in nature, please call the S&WB Water Quality Laboratory, (504) 865-0420. We are pleased to provide this very positive report, which shows that the water supplied by the Sewerage and Water Board is of the highest quality. The entire report is posted here on the website. We hope that you will review it to learn about the purification process and the high quality of your drinking water.

Please scroll to view the entire report.

2016 Quality WATER

A REPORT ON THE STATE OF TAP WATER IN NEW ORLEANS The Sewerage and Water Board is pleased to provide you with this Annual Water Quality Report (also known as the Consumer Confidence Report) for the year 2016. *(Este informe contiene información muy importante sobre su agua potable. Tradúzcalo o hable con alguien que lo entienda bien).* The Board is proud to provide the citizens of New Orleans each day with an abundant supply of quality water for personal and business needs and fire protection.



Sustaining Life Through Safe and Steadfast Water Quality System

From its scanty beginnings in 1718 supporting the city's original 14 blocks, the drainage, sewerage and water infrastructure have made it possible to build and later expand the City of New Orleans. In 1899, the Louisiana Legislature authorized the creation of the Sewerage & Water Board of New Orleans (S&WB) to provide vital water and sewerage services. The Sewerage & Water Board of New Orleans is proud of its 118 year history of providing safe, reliable water to the City of New Orleans including Algiers.

Today, the Sewerage & Water Board supports a thriving and vibrant city more than 350 square miles and a population of more than 401,967 including both the East Bank and West Bank service areas. The Sewerage & Water Board provides New Orleans with high quality water, sewerage and drainage services 24 hours a day, 365 days a year, where and when they are needed. On a normal day, New Orleans and Algiers combined uses approximately 141.3 million gallons of water for essential health,

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SOURCE & TREATMENT

Presented by the Sewerage and Water Board of New Orleans.
Serving the East and West Banks of Orleans Parish.

The Mississippi River water is treated at the Carrollton Water Purification Plant for East Bank customers in Orleans Parish and at the Algiers Water Purification Plant for West Bank customers in Orleans Parish. In 2016, the Carrollton Water Purification Plant provided an average of 131.6 million gallons of drinking water per day to an estimated population of 348,420. The Algiers Water Plant provided an average of 9.7 million gallons of drinking water per day to an estimated population of 53,547. (Source of population figures is GCR, Inc). The treatment process at each plant is similar. The raw water is treated with chemicals called "coagulants" which cause the small particles in the water to come together to form larger particles which are then allowed to settle out of the water. Rapid sand filtration is used to remove even smaller particles. During the process, chloramine is added to disinfect the water. Lime is added to provide corrosion control and to increase the pH of the water to stabilize the disinfectant. Fluoride is added to prevent tooth decay.

How contaminants can get into

SOURCE WATER

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline: (1-800-426-4791).

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

- **Microbial contaminants**, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
- **Inorganic contaminants**, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
- **Pesticides and herbicides**, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
- **Organic chemical contaminants**, including synthetic and volatile organic chemicals, which are byproducts of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
- **Radioactive contaminants**, which can be naturally-occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the U.S. Environmental Protection Agency (EPA) prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. The U.S. Food and Drug Administration regulates and establishes limits for contaminants in bottled water.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

Our water source is the Mississippi River, a surface water source. A Source Water Assessment has been conducted by the State of Louisiana Department of Environmental Quality. This is an assessment of a delineated area around our water source through which contaminants, if present, could migrate and reach our source water. It also includes an inventory of potential sources of contamination within the delineated area, and a determination of the water supply's susceptibility to contamination by the identified potential sources. According to the Source Water Assessment, our water system had a susceptibility rating of high. If you would like to review the Source Water Assessment, contact the Sewerage and Water Board Laboratory at (504) 865-0420 or waterinfo@swbno.org.

The Water Quality Laboratory is located within the Carrollton Water Purification Plant. It monitors river water and finished water from both the East Bank and Algiers. The Water Quality Laboratory assures the safety and purity of the city's water by testing for organic, inorganic and microbiological compounds.

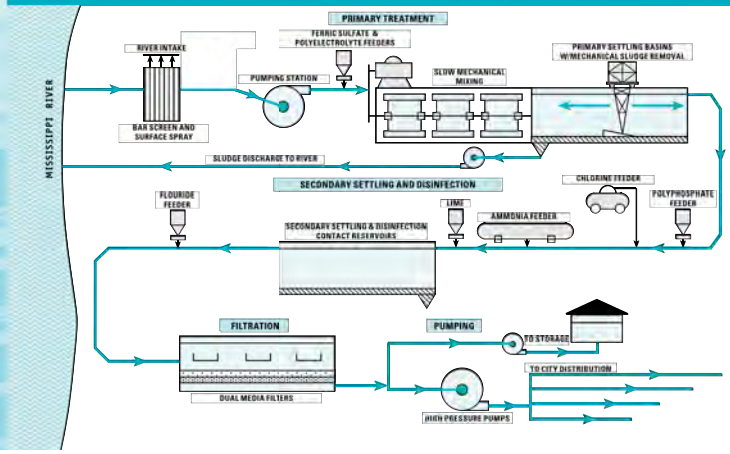
Cryptosporidium

Cryptosporidium is a microscopic organism which, if ingested, can cause diarrhea, nausea, cramps, fever, and other gastrointestinal symptoms. It is found in sewage and animal waste which is washed into rivers and streams when it rains. Cryptosporidium can be found in nearly all surface waters in the United States. The best defense a water utility can provide is an effective treatment process which includes the multiple barriers of effective and continuous coagulation, disinfection, and filtration.

In healthy persons, symptoms usually last two to three days. However, cryptosporidiosis can be very serious for people with severely weakened immune systems, such as chemotherapy and transplant patients and people with HIV infections. These people should consult a physician about extra protection, including boiling water, using certified bottle water, or using a home water filter capable of removing Cryptosporidium.

While we occasionally detect low levels of Cryptosporidium in our source water (Cryptosporidium was not detected in any of our 2016 monthly Mississippi River samples), it has only been detected in our tap water three times – twice in 1998 and once in March 2014. In each instance, the concentration was 1 oocyst or less per 100 liters of water. The test for Cryptosporidium cannot determine if an oocyst is viable or capable of causing illness, and an occasional oocyst in the drinking water of utilities that use surface water is not unusual and does not necessarily indicate a health problem.

General flow diagram of water purification process



DRINKING WATER Quality Results

from 2016 Compliance Monitoring

From January 1st thru December 31st 2016, monitoring was carried out to determine if the quality of the drinking water met State and Federal Regulations. This is called compliance monitoring.

definitions

In the table (right), you will find many terms and abbreviations, some with which you might not be familiar. To help you better understand these terms, we provide the following definitions:

Parts per million (ppm) – This is a measure of concentration which corresponds to one milligram of a substance in one liter of water (mg/L), or about one drop in 10 gallons.

Parts per billion (ppb) – This is a measure of concentration which corresponds to one microgram of a substance in one liter of water (ug/L), or about 1 drop in 10,000 gallons.

Parts per trillion (ppt) – This is a measure of concentration which corresponds to one nanogram of a substance in one liter of water (ng/L), or about one drop in 10,000,000 gallons.

Running Annual Average (RAA) – Average of data from the previous 12 months, calculated after each monitoring event or period.

Locational Running Annual Average (LRAA) – Average of data at a specific monitoring location from the previous 12 months, calculated after each monitoring event or period.

Nephelometric Turbidity Unit (NTU) – This is a measure of the cloudiness of water. Turbidity in excess of 5 NTU is just noticeable to the average person. We monitor turbidity because it is a good indicator of the effectiveness of our treatment process.

Action Level (AL) – The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT) – A required process intended to reduce the level of a contaminant in drinking water.

Maximum Contaminant Level Goal (MCLG) – The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Contaminant Level (MCL) – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Residual Disinfectant Level (MRDL) – The highest level of disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG) – The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Contaminant	Meets Requirements?	Units	Amounts Detected		Highest Level Allowed (MCL)	MCL Goal (MCLG)	Likely Sources
			East Bank	West Bank			
REGULATED CONTAMINANTS detected in 2016							
Total Coliform Bacteria	**Yes**	% Positive samples per month	0 – 1.3	0 – 4.0	5	0	Naturally present in the environment
Turbidity [1]	**Yes**	NTU: Lowest monthly % of samples ≤ 0.3:	0.05 – 0.3 100.0	0.06 – 0.3 100.0	1.49 for any one sample; 95% of samples each month should be ≤ 0.3	N/A	Soil runoff
Fluoride	**Yes**	ppm	0.26 – 0.92 Avg. = 0.71	0.53 – 0.92 Avg. = 0.76	4	4	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
Nitrate+Nitrite (as Nitrogen)	**Yes**	ppm	1.7 – 1.7	1.9	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
Copper	**Yes**	90th percentile ppm: No. sites exceeding AL:	0.2 0 of 60 sampled	0.1 0 of 47 sampled	Action Level = 1.3 for 90th percentile	1.3	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
Lead	**Yes**	90th percentile ppb: No. of sites exceeding AL:	7 1 of 60 sampled	3 1of 47 sampled	Action Level = 15 ppb for 90th percentile	0	Corrosion of household plumbing systems, erosion of natural deposits
Barium	**Yes**	ppm	0.046 – 0.047	0.025	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Selenium	**Yes**	ppb	ND	0.52	50	50	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines
Uranium	**Yes**	ppb	0.53 – 0.54	0.87	30	0	Erosion of natural deposits
Combined Radium	**Yes**	pCi/L	ND – 2.3	ND	5	0	Erosion of natural deposits
Gross Beta Particle Activity [2]	Yes	pCi/L	2.5 – 3.9	1.4	50	0	Decay of natural and man-made deposits
Total Chlorine Residual	**Yes**	ppm	0.5 – 5.0 highest RAA = 3.4	0.0 – 4.9 highest RAA = 2.7	MDRL: RAA should be ≤ 4	MDRLG: RAA ≤ 4	Disinfectant added during water treatment
Total Organic Carbon Removal[3]	**Yes**	ratio	1.00 – 2.08 lowest RAA = 1.19	1.00 – 1.58 lowest RAA = 1.01	TT RAA should be ≥ 1	N/A	Naturally present in the environment
Total Trihalomethanes (TTHMs)	**Yes**	ppb	15 – 39 highest LRAA = 30	11 – 57 highest LRAA = 34	LRAA should be ≤ 80	N/A	Byproduct of drinking water disinfection
Total Haloacetic Acids (HAA5s)	**Yes**	ppb	6 – 29 highest LRAA = 26	7 – 46 highest LRAA = 31	LRAA should be ≤ 60	N/A	Byproduct of drinking water disinfection
UNREGULATED CONTAMINANTS [4] detected in 2014 and 2015 (from EPA's Unregulated Contaminant Monitoring Regulation 3)							
1,4-Dioxane	**N/A**	ppb	ND – 0.40 Avg = 0.18	0.10 – 0.21 Avg = 0.15	N/A	N/A	Used in the manufacture of paper, cotton, textile products, automotive coolant, cosmetics, and shampoos.
Vanadium	**N/A**	ppb	0.5 – 1.1 Avg = 0.8	0.5 – 4.1 Avg = 2.4	N/A	N/A	Naturally present in the environment; used as vanadium pentoxide which is a chemical intermediate and a catalyst.
Molybdenum	**N/A**	ppb	ND – 2.6 Avg = 1.6	ND – 2.2 Avg = 1.2	N/A	N/A	Naturally present in the environment; molybdenum trioxide is a commonly used chemical reagent.
Strontium	**N/A**	ppb	120 – 230 Avg = 176	110 – 180 Avg = 139	N/A	N/A	Naturally present in the environment; was used in the glass of CRT televisions.
Chromium – total	**N/A**	ppb	ND – 0.26 Avg = 0.06	ND – 0.80 Avg = 0.27	N/A	N/A	Naturally present in the environment; used in the manufacture of steel and other alloys.
Chromium – hexavalent	**N/A**	ppb	ND – 0.09 Avg = 0.03	ND – 0.12 Avg = 0.09	N/A	N/A	Naturally present in the environment; used in the manufacture of steel and other allows, chrome plating, dyes and pigments, leather tanning, and wood preservation.
Chlorate	**N/A**	ppb	120 – 490 Avg = 273	92 – 1100 Avg = 438	N/A	N/A	Byproduct of disinfection of drinking water; agricultural defoliant; used in the production of chlorine dioxide.

[1] Turbidity is a measure of the cloudiness of the water. We monitor it because it is a good indicator of the effectiveness of our filtration system. Its sources include soil runoff.

[2] The MCL for Beta Particles is 4 mrem/yr. EPA considers 50 pCi/L to be the level of concern for Beta Particles.

[3] Total Organic Carbon Removal is reported here as the ratio of TOC removal credits to that required by regulation.

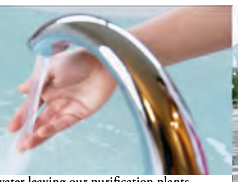
[4] Unregulated contaminants are those that don't yet have a drinking water standard set by EPA. Monitoring for these contaminants helps EPA decide whether these contaminants should have a standard.

N/A = not applicable

Tips for Reducing Lead Exposure from Drinking Water

1. **Flush** your tap if your water has not been used for several hours. Depending on the source of lead, this may take from 30 seconds to 5 minutes. Lead can dissolve into drinking water from lead-containing plumbing when it sits in pipes for several hours.
2. **Use only cold water** for cooking and preparing beverages and infant formula. Lead dissolves more easily in hot water.
3. **Do not** boil water to remove lead. Boiling your water will not reduce lead.
4. **Ask your physician** to test your child's blood lead levels. Louisiana Law requires primary medical providers to perform lead testing on children ages 6 months to 6 years.
5. **Test** your water for lead. Contact the S&WB at 52-WATER for more information.
6. **Regularly clean** your faucets' aerators. Lead particles can collect in aerators.
7. **Install** "lead-free" fixtures. Prior to January 2014, fixtures containing up to 8% lead were allowed to be labeled lead-free. Now all fixtures are required to contain less than 0.25% lead.
8. **Replace** galvanized plumbing. Lead from lead service lines can build up in galvanized pipes and later be released.
9. **Replace** lead service lines. **The service line from the meter to the house is the property owner's responsibility.** If water testing finds high lead levels in your water, the S&WB may replace the service line from the water main to your meter if it is lead. **Be aware** that service line replacements may cause a temporary increase in lead in your drinking water. Studies have found elevated lead levels lasting from days to 6 months after a lead service line replacement.
10. **Consider** using a water filter. Not all filters remove lead. **Be sure the filter meets NSF Standard 53 for lead. Be sure** to replace and maintain the filter according to the manufacturer's instructions.

Is There Lead in New Orleans' Tap Water?



Answer: There is no lead in the treated water leaving our purification plants. However, homes that are unoccupied and homes that are undergoing or have recently undergone plumbing renovation may experience elevated lead concentrations in their tap water. Homeowners should thoroughly flush all household plumbing before re-occupying the property.

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The Sewerage and Water Board of New Orleans is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your drinking water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the US EPA Safe Drinking Water Hotline (1-800-426-4791) or at http://www.epa.gov/safewater/lead.

Who Tests Your Water?

Testing to determine if New Orleans' drinking water complies with State and Federal drinking water quality standards is performed by the Louisiana Department of Health and Hospitals, the Sewerage and Water Board Water Quality Laboratory, and DHH certified contract laboratories. Where a contaminant was detected in compliance monitoring, we have reported it in the table on the back of this page.

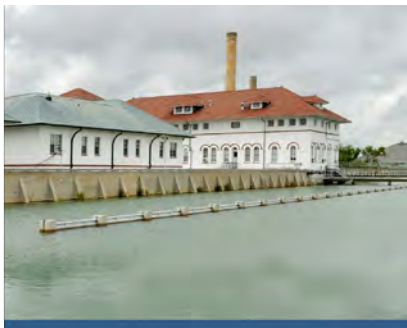
In addition to the compliance monitoring required by drinking water regulations, the S&WB performs daily quality control testing in its laboratory as well as continuous online monitoring of important water quality parameters.

Checking for Chemical Spills in the Mississippi River

The Sewerage and Water Board participates in a program set up by the Louisiana Department of Environmental Quality called the Early Warning Organic Compound Detection System (EWOCDS). DEQ provides equipment at locations along the Mississippi River from Baton Rouge to New Orleans to check for volatile organic contaminants in the river.

The New Orleans location is the Sewerage and Water Board Water Quality Laboratory. Lab personnel analyze river samples each day and report any contamination to DEQ. The S&WB in turn benefits from advance notification of spills provided by upriver EWOCDS locations.

Algiers Water Purification Plant



Carrollton Water Purification Plant

continued from cover

household, commercial, industrial and fire-fighting purposes.

Reliable, high quality water is a basic need essential to everyone. It is, therefore, worth knowing the specific details about your water quality. The Sewerage & Water Board 2016 Water Quality Report explains where New Orleans' water comes from, what's in it, how it's monitored, tested, treated, delivered and more.

The Sewerage & Water Board employees are proud that, once again, the first-rate quality drinking water they produced in 2016 met or exceeded all U.S. Environmental Protection Agency water quality standards and regulations. The Sewerage & Water Board delivered this high quality and abundant water supply to homes and businesses in Orleans Parish for drinking, personal care and fire-fighting needs. A team of expert managers, engineers, operators, machinists, laboratory chemists, technicians, environmental experts, pumping and power professionals, experienced pipe, valve and fire hydrant repair crews and administrative support personnel all work to achieve a single goal. That goal is a safe and steadfast water supply for the citizens of New Orleans.

The Sewerage & Water Board manages a complex water supply system stretching from the East Bank to the West Bank and featuring an intricate series of pipelines and treatment systems. Two features of this system stand out. First, the drinking water provided is among the safest in the country. Second, the system for delivering that water leads the nation in infrastructure waterline replacement.

The Mississippi River is New Orleans' only source of potable water. The river flows past New Orleans at an average rate of 300 billion gallons per day. Raw river water is brought into two treatment plants by four intakes. The intakes are protected from ships and barges by concrete barriers and wooden pilings. The water is then treated via a complex purification process at the Carrollton Water Purification Plant for East Bank customers and at the Algiers Water Treatment Plant for West Bank customers. Combined, the two plants treat approximately 52 billion gallons of water per year. The plants remove about 23,000 tons of solid material from the raw river water. In 2016, the Carrollton Plant provided an average of 131.6 million gallons of drinking water per day to a population estimated to be about 348,420 people. The Algiers Water Plant provided an average of 9.7 million gallons to a population estimated to be about 53,547 people.

Safe drinking water from the treatment plants is distributed through 2,000 miles of pipes, mains and 143,600 service connections. The water is also carried to approximately 17,000 fire hydrants for fire-fighting purposes.

Water Quality Laboratory Conducts Continuous Monitoring

The Sewerage & Water Board maintains a state-of-the-art Water Quality Laboratory to safeguard continuous and consistent superior water quality. The lab occupies 8,500 square feet of floor space in the Carrollton Water Plant. It is a cutting-edge environmental analysis facility, employing state-of-the-art technology for detecting and identifying contaminants in water at sub part per billion concentrations. The overall laboratory is divided into areas specifically designed and equipped for organic, inorganic, microbiological and plant production analyses.

The Water Quality Laboratory is staffed by chemists, microbiologists and technicians. Key instrumentation used by the lab includes a gas chromatogaph-mass spectrometer system, a gas chromatograph, and a total carbon analyzer. The laboratory performs analyses for monitoring the quality of river water and finished water sampled from locations throughout the East Bank and West Bank sections of the city. Information generated in the laboratories is used to control plant treatment processes and research methods to improve those processes and the drinking water.

The Water Quality Laboratory works in conjunction with the Louisiana Department of Health & Hospitals (DHH) on water testing. The Water Quality Laboratory regularly collects and tests water samples from designated sampling points throughout the system. These tests ensure the water delivered to New Orleans meets or exceeds federal and state drinking water standards and regulations.

continued page 8

(left) This photo shows crews replacing a 48" waterline in the construction of the Florida Avenue Canal Project, a part of the relocation and replacement of waterlines included in the Southeast Louisiana Urban Flood Control Program (SELA). Besides waterline replacement being a part of SELA, the city has a larger city-wide multi-year infrastructure repair/recovery waterline replacement program funded by FEMA. This program is designed to restore the city's water distribution system. To ensure that the city is maximizing available funding, various agencies are involved in the co-ordination efforts of the program.

(right) The two new elevated water storage tanks planned for the Carrollton Plant will be a compliment to those tanks currently in service. These tanks will have a combined capacity of 4 million gallons and not exceed 200 feet in height. They will help mitigate the loss of water pressure due to power interruptions.

continued from page 7

New Orleans Trailblazer In Replacing Aging Infrastructure

The ongoing issues with water quality in Flint, Michigan have raised concerns over aging infrastructures in cities across the country. In most U.S. cities these outdated infrastructures include lead piping. But, while most cities are scratching their heads trying to figure out how to pay the enormous costs of an infrastructure overhaul, New Orleans is currently engaged in the most massive waterline replacement in the city's history. The Sewerage & Water Board of New Orleans is able to undertake this colossal endeavor because of FEMA and other funding secured post Hurricane Katrina.

The S&WB is currently implementing a $188 million Waterline Replacement Program which is part of a larger City-wide, multi-year infrastructure repair/recovery effort funded by FEMA. The S&WB is coordinating design activities with the Department of Public Works' (DPWs') Recovery Roads Program. The water lines are being replaced concurrently with the Recovery Roads Program. FEMA worked with the S&WB and Department of Pubic Works (DPW) to develop a systematic, cost effective approach to restore the water distribution system. Approximately 135 miles of water lines qualified for replacement citywide. The program affects residents citywide and is being managed on a neighborhood-by-neighborhood basis.

A Rigorous Purification Process Safeguards High Quality Water

The Sewerage & Water Board utilizes a stringent, 3-stage water purification process to ensure water safety. The water that leaves the Eastbank and Westbank treatment plants is safe, high quality drinking water that is lead-free. As a municipal water utility, the S&WB is highly regulated by both the Environmental Protection Agency (EPA) and the Louisiana Department of Health & Hospitals (DHH). EPA regulations indicate that 90 percent of the homes sampled must have no greater than 15 parts per billion (ppb) of lead in the drinking water. Samples in New Orleans have consistently been below EPA's action levels.

Once water leaves the treatment plant it may pass through lead service lines between the water main and the residence or building. The pipes do, however, have a protective coating and corrosion control chemicals are used to minimize lead contamination. The Waterline Replacement Program will replace existing pipes with concrete and PVC pipe. Since the Sewerage & Water Board is only responsible for service lines up to the meter, homeowners with old lead pipes are encouraged to replace them with PVC piping. If the homeowner is unable to replace the plumbing, water filters are available in varying price ranges that filter out lead. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the US EPA Safe Drinking Water Hotline (1-800-426-4791) or at http://www.epa.gov/safewater/lead.

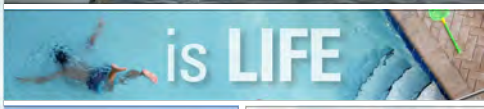
Annual Water Quality Report

Since 1998, the U.S. Environmental Protection Agency (EPA) has required all water utilities to produce and distribute annual water quality reports. The report is extensive and elaborates in its discussions on how the board meets EPA water standards and regulations. The EPA, with further enforcement by the Louisiana Department of Health and Hospitals (DHH), regulates for contaminants that are selected for enforcement. The board has been vigilant and proactive in its water purification mandates and complies with all regulations.

2016 Quality WATER

Sewerage and Water Board of New Orleans

Drinking water is one of the essential ingredients for life. We at the Sewerage and Water Board of New Orleans are committed to supplying safe drinking water of a quality that surpasses the requirements of State and Federal Regulations.



Conclusion

We are confident that a review of this report will help you better understand your water system and the complete dedication of the Sewerage and Water Board members and staff to provide the highest quality water for its customers—the citizens of New Orleans. After all, the Board members and employees are customers too. We are proud of our water, which has been judged the "Best Tasting" in competition with other water from cities throughout the United States. Taste is important, but equally important are the other water quality parameters described in this report. The Sewerage and Water Board will continue to produce high quality water through the use of proven treatment processes, as well as modern technology.

FOR MORE INFORMATION— Sewerage and Water Board of New Orleans

Laboratory: (504) 865-0420 | Emergency Department: (504) 52-WATER (529-2837) | E-mail address: waterinfo@swbno.org
Internet Home Page: www.swbno.org

More information can be obtained at Sewerage and Water Board meetings which are held on the third Wednesday of every month at 625 St. Joseph St., New Orleans, LA 70065, at 9 a.m.

U.S. E.P.A. Safe Drinking Water Hotline: 1-800-426-4791 | U.S. E.P.A. Drinking Water Internet Home Page: www.epa.gov/safewater

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Water Audit

FY 2008 – FY 2015

Technical Memorandum

Sewerage and Water Board of New Orleans

March 15, 2017

Water Audit
Sewerage and Water Board of New Orleans
Fiscal Years 2008 – 2015

Technical Memorandum

To: Bob Miller, Deputy Director SWBNO

From: Nora Freeman, Freeman LLC

Date: March 15, 2017

Executive Summary

A water audit update for the Sewerage and Water Board of New Orleans (SWBNO) was performed by the consultant using the standard methodology outlined in the American Water Works Association's (AWWA) M36 Manual: Water Audits and Loss Control (4th edition). This methodology was co-developed by AWWA and the International Water Association (IWA) and includes clear steps to conduct the audit along with standard definitions.

The objectives of the water audit update were to prepare the 2015 Infrastructure Leak Index (ILI) without additional data development and field work, document source data, trend water audit key indicators over the last eight years (2008 – 2015), compare the SWBNO ILI results to similar utilities in size, age and infrastructure and to present recommendations for a reasonable ILI target and associated actions for improvement.

Based on the data inputs provided, SWBNO's ILI and Non-Revenue Water (NRW) annual performance for the past eight years is as follows:

FISCAL YEAR	ILI	NRW % by Cost
2008	46.0	22.9%
2009	46.6	24.3%
2010	41.9	20.1%
2011	44.7	16.2%
2012	43.2	16.5%
2013	36.8	17.1%
2014	37.1	16.5%
2015	35.9	17.9%

SWBNO's 2015 ILI was the lowest (35.9) of the eight years of calculations. SWBNO's 2013 ILI was second lowest with a result of 36.8. The 2015 ILI result is driven by two factors: 1) Reduction in Real Losses in FY2015 and 2) the Unavoidable Annual Real Loss (UARL) in FY2015 is the highest it has been over the eight years of water audit calculations. The UARL increase in FY2015 was driven most significant by the 1.5% increase in the number of customers in FY2015 over FY2014. UARL is a reference value representing the technical low limit of leakage that could be achieved if all of today's best technology could be successfully applied. It is a theoretical value formulated based on factors provided by the AWWA methodology.

NRW is defined as the difference between System Input Volume and Billed Authorized Consumption. Said another way, NRW is all Unbilled Water, plus Real Losses plus Apparent Losses.

SWBNO's ILI and NRW annual performance continues to indicate an opportunity for significant improvement. One improvement that can be more directly implemented is the development of methodology to account for SWBNO Real Losses and Apparent Losses. In this current analysis, the majority of losses in both the Real Losses and Apparent Losses categories were input at zero since SWNBO does not currently have estimates they feel are accurate. SWBNO NRW will certainly decrease as accurate estimates can be obtained.

In order for SWBNO to improve water accounting, staff should consider indentifying a single point of accountability for updating the water audit and ILI performance. This accountability could be with a single manager or a team of managers. It is recommended that the accountable individual(s) focus on making incremental year-over-year improvements to the inputs of the water audit data in two categories: Real Losses and Apparent Losses. Real Losses include water loss that could be recoverable within the distribution system such as assumed leaks on active water mains or abandoned service lines, any type of errors or overflows that are captured through the SCADA system and leaks that occur on private property (after the meter).

Improvements to water audit data inputs should also be made to the Apparent Losses category of the audit. The Apparent Losses are "paper" losses of water that can occur in the billing system. For instance, "paper" losses happen when accounts are not entered into the billing system correctly or when there are conversion errors when data is transferred into the billing system either from meter reading or when new services are set up. Apparent Losses also include water losses due to broken or malfunctioning meters, adjustments made to customer accounts due to the customer's water leak and any unauthorized use of water (e.g., theft).

Furthermore, SWBNO should examine and ensure the accuracy of the Water System Input Volume number. This figure relies almost exclusively on the exactness of the SWBNO production master meters. The testing results and routines for these production meters should be considered, and adjustments to the System Input Volume made accordingly.

SWBNO should also continue its efforts to improve the integrity of its distribution system. These two undertakings, working on improving water audit data inputs and improving the distribution system integrity performed in parallel, will bring consistent improvement in the ILI and NRW indicators.

Finally, it needs to be pointed out that SWBNO provides significant amounts of free water to local government institutions, according to state statutes. SWBNO should continue to evaluate whether changes in the number and types of institutions receiving free water is reasonable. The water industry as a whole as moved to greater accountability for all its water use, including water that is provided for public or charitable purposes. Many utilities in the country use an inter-fund transfer for payment of water and related services to other city or public agencies/departments.

SWBNO should also seek to lower the caps in the amount of free water provided to the revenue-generating public agencies. These caps are almost 30 years old and water usage trends nationally have declined dramatically in the last 10 years.

With regard to a recommended ILI target for SWBNO, the focus again should be on achieving year-over-year improvements to the ILI. SWBNO has shown improvements in driving down the ILI over the last 3 years. Based on the ILI results in 2008 - 2015, an annual goal of reducing the eight year average ILI by 4 appears to be a reasonable target. Using a multi-year ILI average reduces the variability in year-to-year results. The eight year ILI average is 41.5 and decreasing it 4 points between 2016 and 2020 translates into a recommended ILI target goal of reaching 21.5 by 2020. At that time, hopefully the distribution system integrity and economic conditions are both greatly improved and an ILI target consistent with industry ranges can be planned.

SWBNO is in a unique operating and economic environment due to the destruction and damage caused twelve years ago by the 2005 Hurricane Katrina. Its circumstances and performance is not readily comparable to any other utility in the country nor was its exceptional situation considered by the Water Loss Control Committee when they were drafting the target range recommendations for the M36 manual (that can be found later in this report). Thus, ILI comparisons to other utilities will be of minimal value now and likely into the near future as well. Available ILI data is presented later in this report, however, for reference.

Introduction

The consultant performed a water audit using data available from SWBNO and the standard methodology outlined in the 2009 AWWA M36 Manual: Water Audits and Loss Control. This methodology was co-developed by AWWA and the IWA and includes clear steps to conduct the audit along with standard definitions.

The scope of work for the SWBNO water audit included:

- Customizing the basic AWWA water audit spreadsheet software application for SWBNO
- Gathering the data needed to populate the water audit model without additional field work
- Documenting source data and identifying estimates used for the calculations
- Reviewing SWBNO's Water Contributed for Public Purposes
- Computing SWBNO's ILI for the past five years
- Obtaining ILI data from other utilities using the AWWA and IWA standards
- Preparing a final water audit report along with the electronic version of the water audit model.

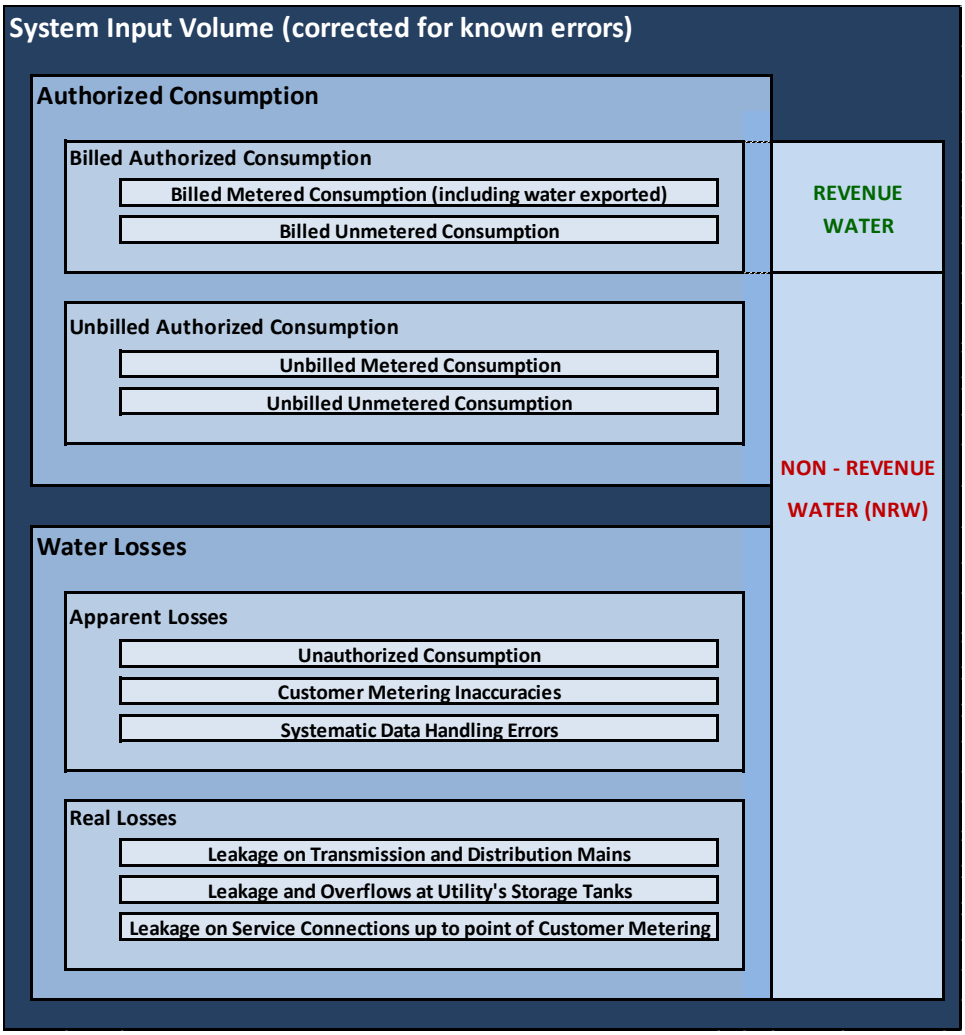
To accompany the new M36 Manual: Water Audits and Loss Control, free water audit software, in Excel format, is available on AWWA's website. The software, updated in 2014, can be found by copying or typing the below into your web browser:
http://www.awwa.org/home/awwa-news-details/articleid/2641/awwa-free-water-audit-software-version-5-0-now-available.aspx

This software is an elementary start for those utilities that want to complete a water audit for a single year. Since SWBNO desired multiple years of data for this water audit, a more detailed water audit Excel model and workbook was built exclusively for SWBNO. This Detailed Water Audit workbook is based upon the work of the Philadelphia Water Department (PWD) and George Kunkel, a national leader in water auditing, and the Louisville Water Company (LWC), which has been piloting annual water audits using the new methodology, in beta form beginning in 2005. This customized Excel model will also be maximally beneficial for SWBNO's future water auditing work.

It should be pointed out that 2010 was first time SWBNO has conducted a water audit using the new AWWA/IWA methodology. This methodology is currently only being used by the most progressive and/or most water-challenged utilities around the country. SWBNO staff are to be commended for their forward-thinking in taking this first step in improved water accounting and setting a baseline upon which future improvements can be quantitatively measured.

AWWA Water Audit Methodology: A Review

The AWWA M36 Manual: Water Audits and Loss Control that was first published in 2009, and is in its 4th edition in 2016, provides standard definitions to calculate water loss for the first time in US water industry's history. These standard definitions and calculations assist with target-setting for the utility along with benchmarking across utilities (although most utilities have yet to implement the model and the few utilities that are using it are often reluctant to share their data). The AWWA methodology is based on the IWA's own methodology and is summarized in the following diagram:



Definitions for the components of the water audit can be found in Appendix A.

SWBNO Water Audit Results

The Water Audit Model and calculation spreadsheets that comprise the SWBNO Detailed Water Audit for FY2008 – FY2015 can be found in Appendix B. The results of the water audit performance indicators for fiscal years 2008 -2015 are summarized below. The change in the key result indicators from FY2008 and FY2015 are presented, and green indicates a change that shows stronger performance.

PERFORMANCE INDICATOR	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	Change FY15 vs. 08	5 Year AVG FY11-15
Financial Indicators										
Non-Revenue Water as percent by Volume	75.1%	75.2%	71.3%	73.5%	73.8%	71.1%	72.1%	70.7%	-4.4%	72.2%
Non-Revenue Water as percent by Cost	22.9%	24.3%	20.1%	16.2%	16.5%	17.1%	16.5%	17.9%	-5.0%	16.8%
Water Resources Indicators										
Inefficiency of use of Water as a Resource	58.3%	59.7%	53.9%	57.0%	57.6%	54.6%	55.4%	54.2%	-4.1%	55.8%
Operational Efficiency Indicators										
Apparent Losses as % of System Input Volum	0.75%	0.74%	0.86%	0.80%	0.79%	0.87%	0.84%	0.88%	0.1%	0.8%
Real Losses per Service Connection per Day	819.4	811.8	704.5	725.7	707.5	616.9	620.0	597.0	-222.49	653.4
Real losses per Mile of Main per Day	46,931	49,695	48,565	56,731	53,730	43,074	43,752	42,600	-4,331.08	47,977.3
Real Losses per Serv Conn per Day per psi	13.2	13.1	11.4	11.7	11.4	9.9	10.0	9.6	-3.59	10.5
Unavoidable Annual Real Losses (UARL)	1.83	1.91	1.84	1.93	1.99	2.11	2.13	2.16	0.33	2.1
Infrastructure Leakage Index (ILI)	46.0	46.6	41.9	44.7	43.2	36.8	37.1	35.9	-10.17	39.6

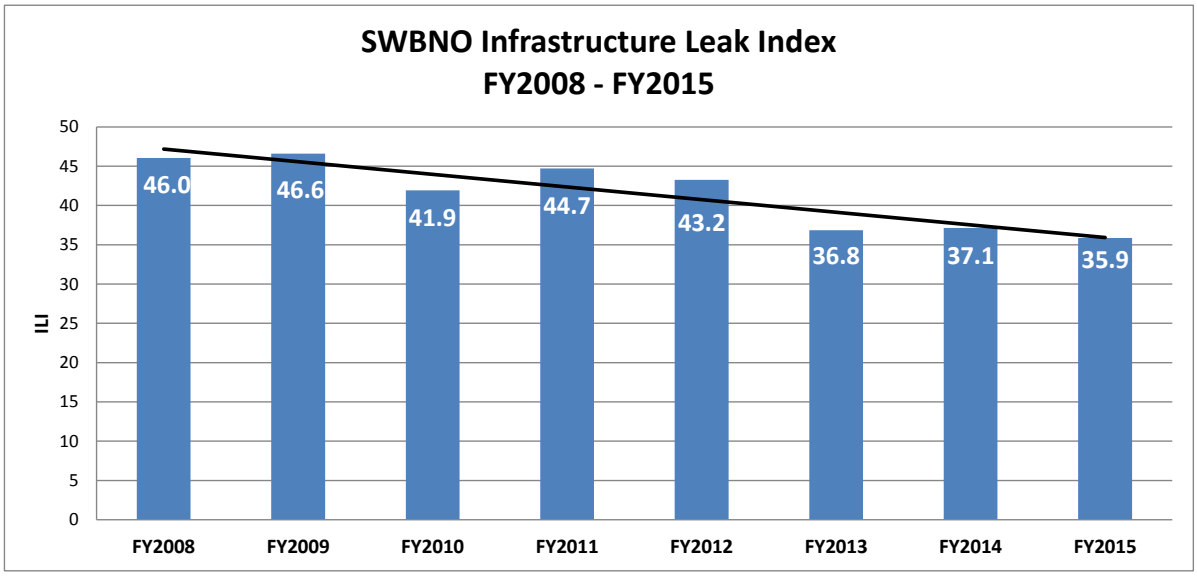
Infrastructure Leak Index

The ILI is a key performance indicator in the water audit. SWBNO's lowest ILI performance was this latest year of analysis, FY2015, with a result of 35.9. The FY2013 ILI performance was the second lowest of the eight year study period with a result of 36.8. The SWBNO ILI ranges from a low of 35.9 in FY2015 to a high of 46.6 in FY2009.

The low ILI results in FY2015, FY2014 and FY2013 are driven by two factors: 1) Reduction in Real Losses in these 3 most recent years over prior years and 2) the Unavoidable Annual Real Loss (UARL) in FY2015, FY2014 and FY2013 are higher than in any of the previous years of water audit calculations.

The UARL increase in FY2013-FY2015 was driven by both the increase in miles of main, which increased almost 13% between FY2012 and FY2013 and number of customers, which increased almost 4% between FY2012 and FY2013, and approximately 1.5 percent a year since. UARL is a reference value representing the technical low limit of leakage that could be achieved if all of today's best technology could be successfully applied. It is a theoretical value formulated based on factors provided by the AWWA methodology.

Future improvements in estimating Real and Apparent Losses within the water audit will directly impact the ILI indicator in a positive direction. The following chart illustrates SWBNO's ILI performance from FY2008 - FY2015.



The ILI is calculated by taking the Real Losses in the distribution system and dividing by the UARL. Again, the UARL is a reference value representing the technical low limit of leakage that could be achieved if all of today's best technology could be successfully applied. It is a theoretical value formulated based on factors provided by the AWWA methodology

SWBNO's ILI performance greatly exceeds any other large water utility in the United States currently performing water auditing and publically sharing their results, as demonstrated in the next section of the report. SWBNO staff is to be commended, however, for establishing their ongoing ILI baseline as part of this study and should seize the opportunity to make significant improvements to its water accounting and auditing in the coming years.

Non-Revenue Water

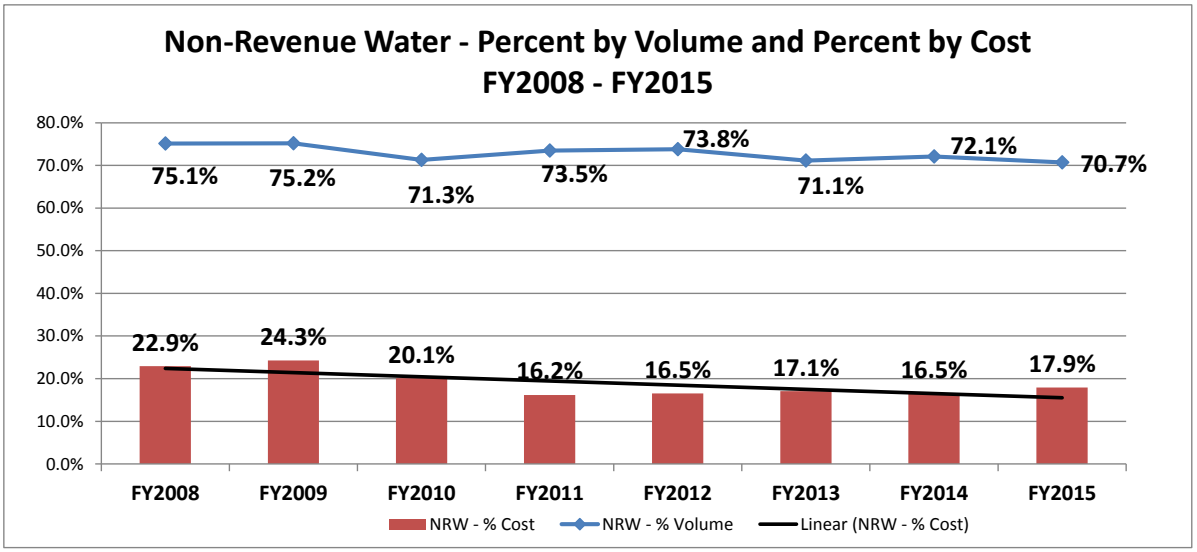
Non-Revenue Water (NRW) is calculated both as a percent of water volume and a percent of cost. Along with the ILI, both are key performance indicators to track as a part of the water audit.

NRW as a Percent of Cost

NRW as a percent of cost in FY2015 was 17.9%. NRW as a percent of cost ranged from a low of 16.2% in FY2011 to high of 24.3% in FY2009. NRW as a percent of cost in FY2015 was 17.9%. NRW as a percent of cost has remained relatively stable for the last five years ranging between 16-18%.

NRW as a Percent of Volume

NRW as a percent of volume was it's lowest in eight years of water audit analysis in FY2015 and was 70.7%. NRW as a percent of volume was its highest in FY2009 with a result of 75.2%. NRW as a percent of volume has remained fairly consistent over the eight year study period. The following chart illustrates NRW as a percent of cost and volume for FY2008-2015.



It should be noted that SWBNO's NRW by volume (70+%) is extremely high for municipal water utilities. This is due in part to the amount of free water that is contributed by SWBNO for public purposes. For comparative purposes, the Philadelphia Water Department (PWD) may be a good example to look at due to the fact that the utility has been conducting water audits for many years and it is of similar age, size, demographics and infrastructure to SWBNO. PWD's NRW by volume has ranged from a high of 36.3% to a low of 32.1% between the years 2000 and 2008.

ILI Comparisons

Research into ILI performance at other water utilities using AWWA's water audit methodology was performed as part of this analysis for SWBNO. This water audit approach is still becoming standard for many US water utilities and only a select few states, where water is a scarce resource, are moving to mandate water auditing. Utilities that have begun to use this approach are just starting to share their water audit and ILI data.

In 2011, twenty one water utilities provided their water audit data to members of the AWWA Water Loss Control Committee for review and careful validation of the data. This is the first validated ILI data set from individual North American water utilities, and this work remains unrepeated since 2011. This data was presented at the 2011 AWWA Annual Conference and Exposition and at the 2011 AWWA Distribution System Symposium.

The key performance indicators for these twenty one utilities are shown below where average and a minimum and maximum range for each key performance indicator versus SWBNO's FY2015 results are presented.

Key Performance Indicator	# of utilities	Average	Range	SWBNO FY2015 Results
NRW - % by Volume	21	22.6%	6.8% - 45.5%	70.7%
NRW - % by Cost	21	10.0%	1.7% - 23.0%	17.9%
NRW - Total Annual Cost (million $)	21	5.81	0.04 - 42.97	43.64
Apparent Losses (gals/conn/day)	21	14.95	2.36 - 65.89	0.9%
Real Losses (gals/conn/day)	18	63.32	17.07 - 149.71	597
Real Losses (gals/mile of main/day)	3	1,821.15	645.42 - 3,496.21	42,600
Infrastructure Leak Index (ILI)	21	3.57	1.15 - 12.68	35.9

As SWNBO is a large utility, the below table may be most helpful for comparison purposes as it outlines the differences in the water audit key performance indicators for large and small utilities (defined as less than and greater than 50,000 connections).

	# connections < 50,000			# connections > 50,000		
Key Performance Indicator	**# of utilities**	**Average**	**Range**	**# of utilities**	**Average**	**Range**
NRW - % by Volume	10	24.1%	12.2% - 45.5%	11	21.4%	6.8% - 39.6%
NRW - % by Cost	10	9.3%	3.1% - 17.5%	11	10.6%	1.7% - 23.0%
Apparent Losses (gals/conn/day)	7	10.38	2.36 - 20.64	11	19.11	6.45 - 65.89
Real Losses (gals/conn/day)	3	58.71	26.08 - 149.71	11	66.24	17.07 - 124.36
Real Losses (gals/mile of main/day)	10	1,821	645 - 3,496	0		
Infrastructure Leak Index (ILI)	10	3.51	1.24 - 12.68	11	3.62	1.15 - 9.89

The twenty one utilities that participated in this 2011 AWWA water audit data validation study include:

1. City of Asheboro (NC)
2. Austin Water Utility (TX)
3. City of Belmont (NC)
4. Birmingham Water Works Board (AL)
5. City of Calgary, Alberta (Canada)
6. Greater Cincinnati Water Works (OH)
7. Cobb County Water System (GA)
8. Dalton Utilities (GA)
9. DC Water and Sewer Authority (Washington DC)
10. Golden State Water Company, Clearlake (CA)
11. Golden State Water Company, Ojai (CA)
12. Halifax Regional Water Commission, Nova Scotia (Canada)
13. Louisville Water Company (KY)
14. Orange County Utilities Department (FL)
15. Philadelphia Water Department (PA)
16. Pennsylvania American Water, Pittsburgh (PA)
17. City of Rio Rancho (NM)
18. Washington County Service Authority (VA)
19. City of Wauwatosa Water Utility (WI)
20. City of Wilmington (DE)
21. Water and Wastewater Authority of Wilson County (TN)

For more specific utility ILI performance, below is 2012 ILI data provided by the American Water Works Association. Of the utilities on this list, DC Water and Sewer is probably the most comparable to SWBNO given the age, urban demographics and complexity of infrastructure.

Utility	2012 ILI
DC Water & Sewer Authority (Washington DC)	7.2
Greater Philadelphia (107 systems)	4.0
Birmingham Water Works	4.0
Pennsylvania American Water, Pittsburgh	3.3
Metro Water Services (Nashville)	3.3
Austin Water Utility	3.0
Louisville Water Company	2.4
Greater Cincinnati Water Works	2.4
Orange County (FL) Utilities Department (Orlando)	1.3
Cobb County Water System (Atlanta)	1.1

It needs to be pointed out that many utilities found in the table above have been conducting water audits for many years and over that time have developed sophisticated methods for estimating water losses across the audit. As SWBNO continues to refine its water audit methodology and develop confident estimates of water loss, their ILI will reduce.

Recommendations for ILI Target and Actions for Improvement

The AWWA M36 Manual recommends that ILI target-setting be an internal process for each utility and that the goal should be improvement to the ILI over time, not reaching some "ideal target" or mean ILI of comparable utilities. AWWA's Water Loss Control Committee and their M36 Manual recommends the following financial, operational and water resource considerations be evaluated by a utility when looking to set an ILI target:

Target ILI Range	Financial Considerations	Operational Considerations	Water Resource Considerations
<1.0	Two possibilities exist if the ILI is less than 1.0: 1) You are maintaining your leakage at low levels in a class with the top worldwide performers in leakage control or 2) A portion of your data may be flawed, causing your losses to be greatly understated. This is likely if you calculate a low ILI but do not employ extensive leakage control practices in your operations.		
1.0 – 3.0	Water resources are costly to develop or purchase; ability to increase revenues via water rates is greatly limited because of regulations or low ratepayer affordability.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet the demand.	Available resources are greatly limited and are very difficult and/or environmentally unsound to develop.
>3.0 – 5.0	Water resources can be developed or purchased at reasonable expense; periodic water rate increases can be feasibly imposed and are tolerated by the customer population.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions are included in the long-term planning.
>5.0-8.0	Cost to purchase or obtain/treat water is low, as are rates charged to customers.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Water resources are plentiful, reliable, and easily extracted.
Greater than 8.0	Although operational and financial considerations may allow a long-term ILI greater than 8.0, such a level of leakage is not an effective use of water as a resource. Setting a target level greater than 8.0, other than as an incremental goal to a smaller long-term target, is discouraged.		

As previously noted, SWBNO is in a unique operating environment due to the destruction and damage caused by Hurricane Katrina in 2005. Its circumstances and performance is not readily comparable to any other utility in the country nor was its exceptional situation considered by the Water Loss Control Committee when they were drafting the above target range recommendations for the M36 manual. SWBNO needs to focus, therefore, not on reaching a certain target ILI range, but rather on the incremental year-over-year improvement to the ILI as part of its internal processes and annual goal-setting. Based on the ILI results in 2008 - 2015, an annual goal of reducing the ILI by 4, based on the 8 year ILI average, appears to be a reasonable target. Using a multi-year average reduces the variability in year-to-year results, and the eight year ILI average is 41.5. This translates into a recommended 5 year ILI target goal of reaching 21.5 by 2020. At that time, hopefully the distribution system integrity and economic conditions are both improved and a 5-10 year ILI target in the range of similar utilities can be planned.

The following suggestions are offered to SWBNO as ways to improve its ILI performance over time:

1. **Update the Water Audit Annually.** The water audit should be updated on an annual basis. A single manager or group of managers should be identified to take responsibility for SWBNO's water audit and the identified person(s) should be held accountable for the utility's water auditing progress. The responsible person(s) should select a cross-functional team consisting of in-house staff from distribution operations, treatment plant operations, billing and customer service, finance, information technology and engineering. Finance will be a key player on the team and it may be useful to consider having one of the accountable persons be named from the finance department. The water audit should receive the same rigorous attention as the annual financial audit and ideally the updating of the water audit should coincide with the financial audit. The water audit should become part of a long-term strategy to track changes in SWBNO operations management, customer demand and utility policy. The implementation of water auditing is growing in popularity all across the US and water audits are now part of state reporting requirements for California, Texas, North Georgia, New Mexico and the Delaware River Basin Commission (DRBC) which encompasses New York, Pennsylvania, Delaware and the Army Corps of Engineers.

2. **Add and Refine Estimates of Unbilled and Unmetered Water Loss in the Audit**. Potentially the most cost-effective and most impactful way to improve the ILI is to continue data collection to confidently estimate Authorized Water Consumption in the Unbilled and Unmetered category. Authorized Unbilled and Unmetered water is part of every water utility's water loss. Current SWBNO databases should be examined to identify low-cost data capture techniques and estimating for water lost during activities including:

    - all water main flushing, including after a main break repair, after a new main installation and to address and maintain distribution water quality
    - fire hydrant testing
    - finished water storage tank draining.

3. **Add and Refine Estimates of Apparent Losses.** Apparent Losses are "paper" losses and consist of customer water use that is not recorded due to metering error, billing error, leak adjustments/credits and incorrect assumptions of unmeasured use or unauthorized consumption. The economic impact of Apparent Losses is greater than Real Losses, since the marginal cost of Apparent Losses occurs at the retail rate charged to customers. For this audit, SWBNO Apparent Losses were all input at zero since accurate estimates of loss could not be confidently obtained, with the exception of customer meter under registration. A conservative estimate of 3% loss for each customer class was used to estimate loss. Apparent Losses are absolutely occurring with the SWBNO metering and billing systems. For reference and perhaps a future benchmark, PWD Apparent Losses for its 2008 water audit (including meter inaccuracy, unauthorized consumption and systematic data handling errors) were 8.2% of total system input volume. Current SWBNO databases should be examined to identify low-cost data capture techniques and estimating methods for Apparent Losses including:

    - unauthorized consumption or theft. This includes illegal connections by-passing the meter, water taken out of fire hydrants for heat relief, irrigation, etc. and illegal water restorations of water service after a turn-off for non-payment.
    - billing procedure errors. This can include occurrences of accounts not entered into/created in the billing system but a customer is receiving water service and accounts with active consumption but not billed (or held) for some reason. The losses associated with these types of errors are generally more complicated for utilities to discover and estimate but internal discussions and options for estimating these losses should be considered by SWBNO.
    - broken or defective meters. There are Apparent Losses for the utility between the time a broken or defective meter is identified in the field and ultimately repaired or exchanged.
    - missing meter. There are Apparent Losses for the utility between the time a meter is identified as missing in the field and ultimately replaced.
    - leak adjustments. These are adjustments made to customer accounts, through internal policies, for leaks that occur on the customer side of the meter.

4. **Add and Refine Estimates of Real Losses.** Real Losses are the physical escape of water from the distribution system and include leakage and overflows prior to the point of end use (customer meter). This is water loss that could be recoverable within the distribution system. For this audit, SWBNO Real Losses were all input at zero since accurate estimates of loss could not be confidently obtained. Real Losses are absolutely occurring with the SWBNO distribution system, and are typically the largest volume of water lost by utilities within the water audit framework. SWBNO is not likely to be an exception to this rule. For reference and perhaps a future benchmark, PWD Real Losses for its 2008 water audit were 9.9% of total system input volume. Current SWBNO databases should be examined to identify low-cost data capture techniques and estimating methods for Real Losses including:

    - water lost before a transmission or distribution main break is repaired, both for reported breaks and breaks/leaks that SWBNO thinks goes unreported

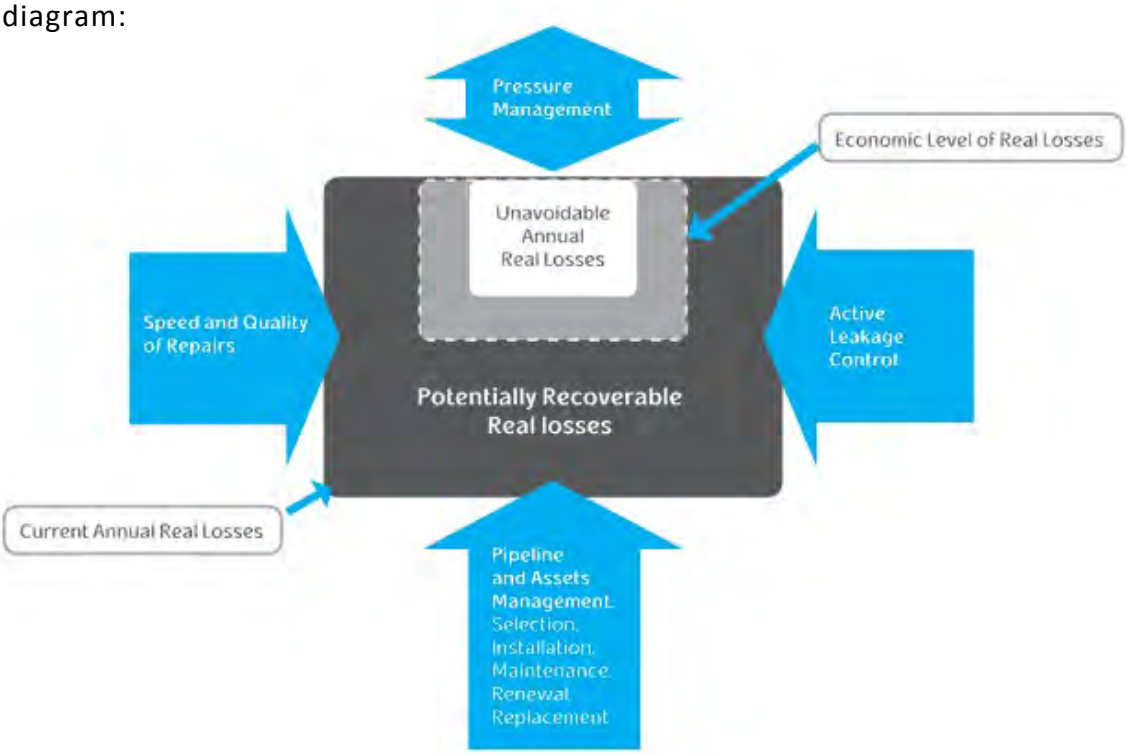
- unreported and reported leaks on fire hydrants
- unreported and reported leaks on distribution system valves
- assumed leaks on abandoned service lines before detection and service discontinuance
- storage tank errors or overflows that are captured through the SCADA system
- water leakage or seepage that occurs at the finished water storage sites.

Although real water loss occurs at the cost of production (involving treatment, operations and maintenance costs), improvements in distribution system integrity should be a high priority for SWBNO. It should be noted, however, that even with improvements to the distribution system and added water audit refinement to Apparent Loss volumes, Real Losses are always likely to be higher.

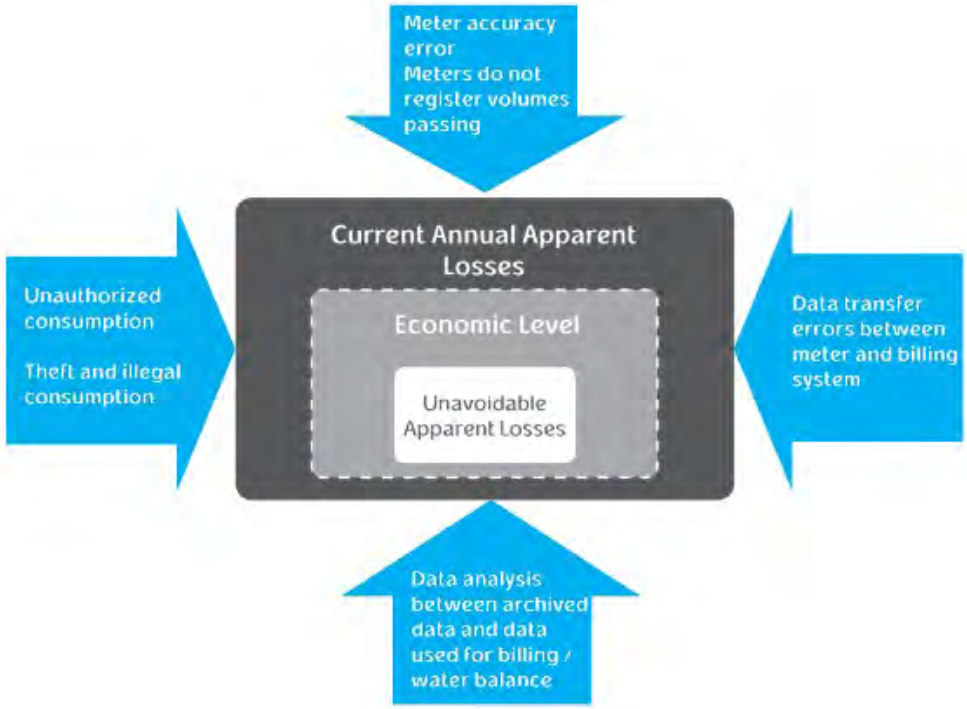
5. **Validate the Accuracy of the System Input Volume.** The System Input Volume is perhaps the most important piece of data in the water audit. All water loss categories are calculated and figured from this number. Therefore, is it vital that the System Input Volume be recorded as accurately as possible. The System Input Volume should include corrections for meter accuracy of the master production meters at the water treatment plants. SWBNO staff should look at the last time the production meters were tested and include appropriate adjustments to System Input Volume within the water audit based on the testing frequency and results. Other factors to consider are SCADA and plant instrumentation outage/maintenance histories, mass balance comparisons of flows into and out of water treatment plants and any specific operational history at the treatment plant facility that could impact production meter accuracy or data reporting.

6. **Identify and Implement Processes to reduce Real and Apparent Loss.** Once confident estimates of Real and Apparent Loss are developed – and this process can take several years - and an updated water audit has been validated, methods to reduce Real and Apparent Loss volumes through field and billing process improvements should be evaluated. This evaluation should include calculating the economic level of loss for both Real and Apparent Losses. This should be balanced with the cost-effectiveness of any new process or procedure implemented.

Factors to consider in the management of Real Losses are outlined in the below diagram:



Factors to consider in the management of Apparent Losses are outlined in the below diagram:



7. **Review and Revise the Quantity of Free Water Provided** – The caps that have been set for the three revenue-generating public agencies (City Park, Audubon Park and the New Orleans Museum of Art) are almost 30 years old. Water Conservation philosophies and the installation of water conservation fixtures has been a continual national trend since these caps were established. Utilities all over the country have seen their water consumption decline across each customer class as a result and this trend is most pronounced in the water utilities serving an urban population. These caps need to be analyzed against actual consumption and re-setting should be considered. Corresponding to the water conservation trend, the water industry has experienced an increased accountability in tracking and ensuring payment for the water consumed. This development can be seen in the establishment of revenue protection units and departments within water utilities and also in the decline of water provided for completely free, even for public or charitable purposes. Many water utilities track water use at public agencies many times inter-fund transfers are charged for the water and related services. SWBNO should consider investigating changes in the state statutes to the number and types of institutions being provided free water.

Summary

The goal of the water audit is to as accurately as possible document all the places – in the street and on paper – that water is lost within the utility. As more water is accounted for within the audit confidently, improvements to the performance indicators will be seen. Then, decisions can be considered about process changes needed to drive increased recovery of operational costs. The water audit data can drive, for instance, discussions on whether it is more economical to implement a program to stop leaking abandoned service lines and ferrules (real loss) or to implement a replacement program to update failing meters (apparent loss).

SWBNO has taken the first step required to quantitatively discuss its water loss and related improvements in economic terms. SWBNO has significant opportunities for improvement to its water auditing and can be successful in their future audit efforts by focusing internally on incremental improvement over time, not on comparisons to other utilities.

Appendix A

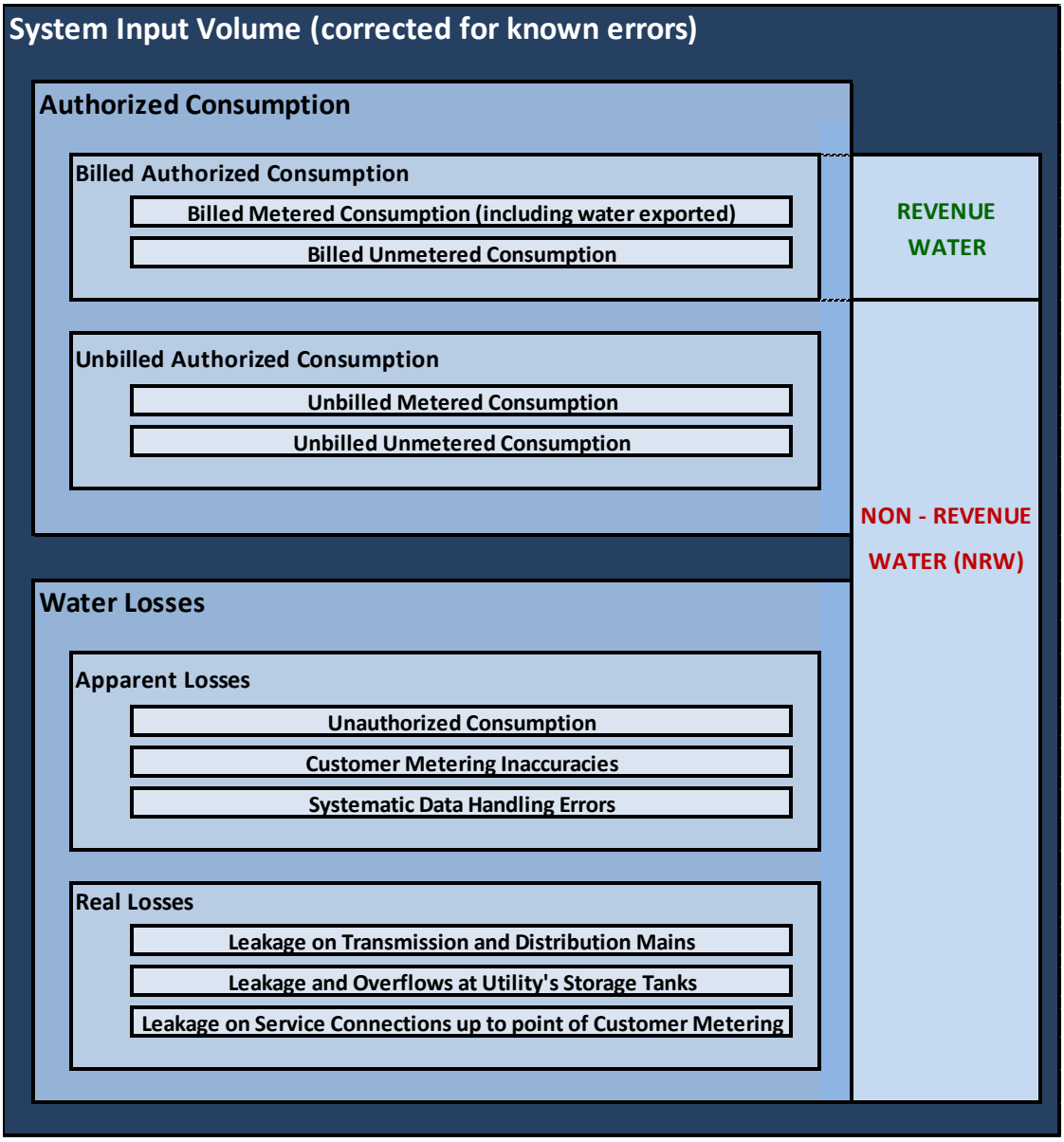
Water Audit

Components and Definitions

Sewerage and Water Board of New Orleans

March 15, 2017

The format and components of the water audit are as follows:



The components of the water audit are defined as follows:

System Input Volume: The annual volume input to the water supply system.

Authorized Consumption: The annual volume of metered and/or unmetered water taken by registered customers, the water supplier and others who are authorized to do so.

Water Losses: The difference between system Input Volume and Authorized Consumption, consisting of Apparent Losses plus Real Losses.

Apparent Losses: Unauthorized Consumption, all types of metering inaccuracies and systematic data handling errors.

Real Losses: The annual volumes lost through all types of leaks, breaks and overflows on mains, service reservoirs and service connections, up to the point of customer metering.

Revenue Water: Those components of System Input Volume which are billed and produce revenue.

Non-Revenue Water (NRW): The difference between System Input Volume and Billed Authorized Consumption.

Unavoidable Annual Real Losses (UARL): A theoretical reference value representing the technical low limit of leakage that could be achieved if all of today's best technology could be successfully applied. A key variable in the calculation of the ILI.

UARL (gallons/ day) = 5.41Lm + 0.15Nc) + 7.5Lp x P where
Lm = length of water mains, miles
Nc = number of service connections
Lp = total length of private pipe, miles = Nc x average distance from curbstop to customer meter
P = average pressure in the system, psi

Infrastructure leak Index (ILI): Ratio of Current Annual Real Losses (CARL) to Unavoidable Annual Real Losses (UARL); good for operational benchmarking for Real Loss control.

Definitions are taken from the 2009 M36 Manual: Water Audits and Loss Control.

Appendix B

Detailed Water Audit

FY 2008 – 2015

Excel Workbook Model and Spreadsheets

Sewerage and Water Board of New Orleans

March 15, 2017

SWBNO Detailed Water Audit for FY 2008 - 2015

using American Water Works Association Format

	Category / Components	Consumption Amount								Annual Cost								Source and Notes
1	**I. System Input Volume**	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
2	**I-a. Finished water delivered from plants**	51,301	52,195	51,958	54,469	55,151	52,264	54,451	52,656									2013 & 2014 CAFR IV-20 & IV-21, 2012, 2011, 2010 CAFR Table IV-E, 2009 CAFR IV-8, 2008 CAFR IV-8
3	**II. Authorized Usage**																	
4	**a. Billed Metered**																	
5	**Retail customers**	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
6	**Residential**	7,734	7,366	7,511	6,639	6,801	7,122	7,153	6,674									2013 & 2014 Report SABR190, 2012, 2011, 2010, 2009 and 2008 CAM Residential + Multi-Family
		FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
7	**Commercial**	7,326	6,977	7,323	7,434	7,625	7,632	6,024	6,067									2013 & 2014 Report SABR190, 2012, 2011, 2010, 2009 and 2008 CAM Commercial
		FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
8	**Industrial**	238	227	158	194	203	261	327	362									2013 & 2014 Report SABR190, 2012, 2011, 2010, 2009 and 2008 CAM Industrial
9	**b. Billed Unmetered**	0	0	0	0	0	0	0	0									
10	**c. Unbilled Metered**																	
11	**Non-Revenue Water**	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	
12	**City of New Orleans & public instit.**	1,450.4	1,415	1,339	1,295	1,423	1,744	972	1,599	$512,722	$465,091	$336,751	$278,014	$308,489	$439,384	$267,378	$554,120	2013 & 2014 Tiffany Julien, 2012, 2011, 2010, 2009 and 2008 Water Contributed for Public Purpos
			2.7%	2.6%	2.4%	2.6%	3.3%	1.8%	3.0%									
13	**d. Unbilled Unmetered**																	
		FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
14	**Capital main construction flushing**	1	1	1	1	1	1	1	1									Estimate based on 49 chlorination jobs in 2011 and 51 in 2012 with 25K gallons used to flush on each job. (25K estimate is based on 12.5K gal/hr measured on auto flushing device used in system for 2 hour flush).
15	**Fire-fighting, street cleaning, flushing sewers, cleaning public spaces**	5130	5,220	5,196	5,447	5,515	5,226	5,445	5,266									Assume 10% of water pumped in each of 2014 - 2008.
16	**Distribution Water Quality**	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
17	**Flushing for Carrollton & Algiers**	33.9	57.5	27.8	38.3	36.3	10.0	6.7	34.7									Carrollton estimate based on metered automatic flushing (in 2009) and manual flushing (2008 & 2009). Manual flushing during June-Sept, 3 time per week, 8 hrs per flush. Auto flushing gal/hr used to estimate manual flushing volume. Only data for Venetial Isles subdivision used for this estimate. Other flushing amounts not quantified (very few).Estimate of additional 30 MG used during boil advisory in Sept - Oct of 2008 due to hurricanes Gustav & Ike. Algiers (.1MG per year) estimate based on 2-3 flushing events per year for 2-3 hour duration. Flushing volume not metered but assumed to be approximately equal to 12K gallons/hr. 2010 assumes similar auto and manual flushing in Venetian Isles to maintain water quality. No emergency flushing in 2010. Limited flushing in Algiers.
18	**Plant Usage**	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
19	**Carrollton**	1428.0	1,450.4	1,435.3	1,507.2	1,526.1	1,501.2	1,513.0	1,466.0									Estimate based on approximately 3% of production.
20	**Algiers**	111.0	107.7	123.5	126.8	128.4	123.2	118.1	113.7									Estimate based on approximately 3% of production.
21	**Total Authorized Water Consumption**	**23,452**	**22,822**	**23,114**	**22,683**	**23,258**	**23,621**	**21,560**	**21,583**									
22	**III. Water Losses (Item I - Item II)**	**27,849**	**29,373**	**28,844**	**31,786**	**31,893**	**28,643**	**32,891**	**31,073**									

SWBNO Detailed Water Audit for FY 2008 - 2015

using American Water Works Association Format

IV. Documented Water Losses																	
A. Apparent Losses																	
Customer meter under registration	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	
Residential, Commercial, Industrial	459	437	450	428	439	450	405	393	$162,258	$143,636	$113,215	$ 91,872	$ 95,175	$113,461	$111,464	$136,196	Assume 3% loss of consumption for each customer class.
Unauthorized Consumption (theft)	0	0	0	0	0	0	0	0									
Customer meter malfunction (broken meter)	0	0	0	0	0	0	0	0									
Accounts lacking proper billing	0	0	0	0	0	0	0	0									
Accounts not entered into system																	
Conversion of data																	
Internal process failures																	
Leak adjustments (actual revenue loss)	0	0	0	0	0	0	0	0									
Apparent Loss Total	**459**	**437**	**450**	**428**	**439**	**450**	**405**	**393**									
B. Real Losses	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
Operator error /overflows	0	0	0	0	0	0	0	0									
Known																	
Unknown-SCADA problems																	
Unavoidable annual real loss (UARL)	**782**	**779**	**771**	**727**	**704**	**682**	**697**	**668**									See UARL worksheet for calculation.
Recoverable leakage																	
Transmission and distribution main leaks	0	0	0	0	0	0	0	0									
Service lines	0	0	0	0	0	0	0	0									
Leaks on private properties	0	0	0	0	0	0	0	0									
Other Estimated Loss from Distribution Sys	0	0	0	0	0	0	0	0									
	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	
Real Loss Total	**782**	**779**	**771**	**727**	**704**	**682**	**697**	**668**	$276,424	$256,123	$193,920	$156,064	$152,577	$171,830	$191,818	$231,517	
	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08	
Documented Water Losses	**1,241**	**1,216**	**1,221**	**1,155**	**1,142**	**1,133**	**1,102**	**1,061**	**$438,682**	**$399,759**	**$307,134**	**$247,936**	**$247,752**	**$285,290**	**$303,282**	**$367,713**	
	FY15	FY14	FY13	FY12	FY11	FY10	FY09	FY08									
Undocumented Water Losses	**26,608**	**28,157**	**27,623**	**30,631**	**30,750**	**27,510**	**31,789**	**30,011**									Item III - Item IV. Also referred to "Balancing Error (Gap)"

Unavoidable Annual Real Loss Calculation FY2008 - FY2015

Assumptions

	FY2015	FY2014	FY2013	FY2012	FY2011	FY2010	FY2009	FY2008	Notes
Miles of Main	1,819	1,812	1,806	1,599	1,519	1,590	1,791	1,791	2014, 2013, 2012, 2011, 2010 CAFR IV-32. 2008 CAFR. 2009 data duplicated 2008 values.
Average psi	62	62	62	62	62	62	62	62	Post Katrina East Bank psi avg is 62-68 psi. West Bank maintains 62 psi exiting treatment plants (Info on Recovery Drive).
Days in year	365	365	365	366	365	365	365	366	2008 and 2012 were leap years w/ 366 days.
Curb stop to meter connections	129,809	127,876	126,106	121,435	118,745	111,834	109,640	102,575	B&V Final Report on Operations
Average length of curb-stop to meter (ft)	30	30	30	30	30	30	30	30	Estimated used based on industry average (30)
	1.5%	1.4%		3.8%					

Calculation

Component	UARL factor	FY 2015 Calculation	
Mains (gal/mile/day/psi)	5.41	222,697,078	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	434,075,082	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	125,180,867	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2015 Total		781,953,026	**781.95**

Component	UARL factor	FY 2014 Calculation	
Mains (gal/mile/day/psi)	5.41	221,840,080	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	434,075,082	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	123,316,785	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2014 Total		779,231,946	**779.23**

Component	UARL factor	FY 2013 Calculation	
Mains (gal/mile/day/psi)	5.41	221,105,510	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	428,066,817	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	121,609,891	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2013 Total		770,782,218	**770.78**

Component	UARL factor	FY 2012 Calculation	
Mains (gal/mile/day/psi)	5.41	196,299,188	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	413,340,453	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	117,426,265	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2012 Total		727,065,906	**727.07**

Component	UARL factor	FY 2011 Calculation	
Mains (gal/mile/day/psi)	5.41	185,968,588	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	403,079,903	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	114,511,336	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2011 Total		703,559,826	**703.56**

Component	UARL factor	FY 2010 Calculation	
Mains (gal/mile/day/psi)	5.41	194,715,233	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	379,620,513	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	107,846,737	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2010 Total		682,182,482	**682.18**

Component	UARL factor	FY 2009 Calculation	
Mains (gal/mile/day/psi)	5.41	219,269,085	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	372,172,980	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	105,730,960	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2009 Total		697,173,026	**697.17**

Component	UARL factor	FY 2008 Calculation	
Mains (gal/mile/day/psi)	5.41	219,869,823	Mains x miles of main x avg. psi x days
Service Connections			
Units rate per gal/service connection/day/psi	0.15	349,144,785	units rate per gal x connections x avg. psi x days
Units rate per gal/mile/day/psi	7.5	99,188,859	units rate per gal/mile/day/psi x connections x avg. psi x days x avg length of curb-stop to meter
FY 2008 Total		668,203,467	**668.20**

FY 2015 PERFORMANCE INDICATORS

		MG Per Year	MG Per Day	
FINISHED WATER DELIVERED	**Total System Input Volume:**	**52,195**	**143.00**	Plant Pumpage
AUTHORIZED CONSUMPTION	Billed Metered:	15,298.00	41.91	
	Billed Unmetered:	-	0.00	
	Unbilled Metered:	1,450.40	3.97	
	Unbilled Unmetered:	6,703.90	18.37	
	Total Authorized Consumption:	**23,452.30**	**64.25**	
WATER LOSSES				
Apparent Losses				
	Unauthorized Consumption:	0.00	0.00	Theft or illegal use
	Customer Metering Inaccuracies & Leak Adjustments:	459	1.26	3% Customer meter under registration and leak adjustments
	Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
	Total Apparent Losses:	**459**	**1.26**	"Paper loss"
Real Losses				
	Total Real Losses:	**28,284**	**77.49**	Physical loss of water from the distribution system
	TOTAL WATER LOSSES:	**28,743**	**78.75**	Apparent Losses plus Real Losses
SYSTEM DATA				
	Length of Mains:	1,819	1,819	length (miles) of all pipelines except service connections
	Number of Service Connections:	129,809	129,809	number of customers
	Connection Density:	**71**	71	# of connections / length of mains (miles)
(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
	Average Operating Pressure:	62.00	62	psi

COST DATA			
Total Annual Cost of Operating Water System Per Year:	$ 84,854,293	Total O&M	
Customer Retail Unit Cost Per MG:	$ 5,066.41	Total O&M / Total Consumption Sold	Total Consumption is Billed and Unbilled Metered
Short-Term Marginal Production Cost Per MG:	$ 353.50	Energy & Chemicals / Total Finished Water Delivered	

PERFORMANCE INDICATORS		
Financial Indicators		
Non-revenue water as percent by volume:	**70.7%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
*** Non-revenue water as percent by cost:**	**17.9%**	See footnote for formula
Water Resources Indicators		
Inefficiency of use of water as a resource:	**54.2%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators		
Apparent Losses per as percent of system input volume:	**0.9%**	Total Apparent Losses / Total System Input Volume
Real losses per service connection per day (when system is pressurized):	**596.95**	Total Real Losses / Number of Service Connections
Real losses per mile of main per day (when system is pressurized):	**42,600**	Total Real Losses / Length of Mains
Real losses per service connection per day per psi (when system is pressurized):	**9.63**	Total Real Losses / Number of Service Connections / Average Operating Pressure
**** Unavoidable Annual Real Losses (UARL):**	**2.16**	UARL estimated using IWA method (See footnote)
Infrastructure Leakage Index (ILI) [Real Losses/UARL]:	**35.87**	

* **Non-Revenue Water as Percent by Cost:**

(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**35,290.35**
total apparent losses x customer retail unit cost	**6,371.19**
total nonrevenue water x 365 days	**15,206,461.31**
total nonrevenue water per day / total annual cost of operating water system	**17.92%**

** **IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2015:**

length of mains x unit rate for UARL per gal/miles/day/psi	**9,841**
# of service connections x unit rate for UARL per gal/service/day/psi	**19,471.35**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**5,531.63**
add totals	**34,843.77**
total x avg operating pressure	**2,160,313.96**
divide by 1,000,000 to calculate per MG per day	**2.16**

FY 2014 PERFORMANCE INDICATORS

		MG Per Year	MG Per Day	
FINISHED WATER DELIVERED	**Total System Input Volume:**	**52,195**	**143.00**	Plant Pumpage
AUTHORIZED CONSUMPTION	Billed Metered:	14,570.00	39.92	
	Billed Unmetered:	-	0.00	
	Unbilled Metered:	1,415.00	3.88	
	Unbilled Unmetered:	6,836.61	18.73	
	Total Authorized Consumption:	**22,821.61**	**62.52**	
WATER LOSSES				
Apparent Losses				
	Unauthorized Consumption:	0.00	0.00	Theft or illegal use
	Customer Metering Inaccuracies & Leak Adjustments:	437	1.20	3% Customer meter under registration and leak adjustments
	Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
	Total Apparent Losses:	**437**	**1.20**	"Paper loss"
Real Losses				
	Total Real Losses:	**28,936**	**79.28**	Physical loss of water from the distribution system
	TOTAL WATER LOSSES:	**29,373**	**80.48**	Apparent Losses plus Real Losses
SYSTEM DATA				
	Length of Mains:	1,812	1,812	length (miles) of all pipelines except service connections
	Number of Service Connections:	127,876	127,876	number of customers
	Connection Density:	**71**	71	# of connections / length of mains (miles)
(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
	Average Operating Pressure:	62.00	62	psi
COST DATA				
	Total Annual Cost of Operating Water System Per Year:		$ 88,562,278	Total O&M
	Customer Retail Unit Cost Per MG:		$ 5,540.34	Total O&M / Total Consumption Sold (Total Consumption is Billed and Unbilled Metered)
	Short-Term Marginal Production Cost Per MG:		$ 328.69	Energy & Chemicals / Total Finished Water Delivered
PERFORMANCE INDICATORS				
Financial Indicators				
	Non-revenue water as percent by volume:		**72.1%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
	*** Non-revenue water as percent by cost:**		**16.5%**	See footnote for formula
Water Resources Indicators				
	Inefficiency of use of water as a resource:		**55.4%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators				
	Apparent Losses per as percent of system input volume:		**0.8%**	Total Apparent Losses / Total System Input Volume
	Real losses per service connection per day (when system is pressurized):		**619.96**	Total Real Losses / Number of Service Connections
	Real losses per mile of main per day (when system is pressurized):		**43,752**	Total Real Losses / Length of Mains
	Real losses per service connection per day per psi (when system is pressurized):		**10.00**	Total Real Losses / Number of Service Connections / Average Operating Pressure
	**** Unavoidable Annual Real Losses (UARL):**		**2.13**	UARL estimated using IWA method (See footnote)
	Infrastructure Leakage Index (ILI) [Real Losses/UARL]:		**37.13**	

Non-Revenue Water as Percent by Cost:	
(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**33,488.19**
total apparent losses x customer retail unit cost	**6,633.22**
total nonrevenue water x 365 days	**14,644,315.69**
total nonrevenue water per day / total annual cost of operating water system	**16.54%**

IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2014:	
length of mains x unit rate for UARL per gal/miles/day/psi	**9,803**
# of service connections x unit rate for UARL per gal/service/day/psi	**19,181.40**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**5,449.26**
add totals	**34,433.58**
total x avg operating pressure	**2,134,882.04**
divide by 1,000,000 to calculate per MG per day	**2.13**

FY 2013 PERFORMANCE INDICATORS

		MG Per Year	MG Per Day	
FINISHED WATER DELIVERED	**Total System Input Volume:**	**51,958**	**142.35**	Plant Pumpage
AUTHORIZED CONSUMPTION	Billed Metered:	14,992.00	41.07	
	Billed Unmetered:	-	0.00	
	Unbilled Metered:	1,338.50	3.67	
	Unbilled Unmetered:	6,783.53	18.59	
	Total Authorized Consumption:	**23,114.03**	**63.33**	
WATER LOSSES				
Apparent Losses				
	Unauthorized Consumption:	0.00	0.00	Theft or illegal use
	Customer Metering Inaccuracies & Leak Adjustments:	450	1.23	3% Customer meter under registration and leak adjustments
	Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
	Total Apparent Losses:	**450**	**1.23**	"Paper loss"
Real Losses				
	Total Real Losses:	**28,394**	**77.79**	Physical loss of water from the distribution system
	TOTAL WATER LOSSES:	**28,844**	**79.02**	Apparent Losses plus Real Losses
SYSTEM DATA				
	Length of Mains:	1,806	1,806	length (miles) of all pipelines except service connections
	Number of Service Connections:	126,106	126,106	number of customers
	Connection Density:	**70**	70	# of connections / length of mains (miles)
(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
	Average Operating Pressure:	62.00	62	psi
COST DATA				
	Total Annual Cost of Operating Water System Per Year:		$ 64,170,327	Total O&M
	Customer Retail Unit Cost Per MG:		$ 3,929.48	Total O&M / Total Consumption Sold (Total Consumption is Billed and Unbilled Metered)
	Short-Term Marginal Production Cost Per MG:		$ 251.59	Energy & Chemicals / Total Finished Water Delivered
PERFORMANCE INDICATORS				
Financial Indicators				
	Non-revenue water as percent by volume:		**71.1%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
	*** Non-revenue water as percent by cost:**		**17.1%**	See footnote for formula
Water Resources Indicators				
	Inefficiency of use of water as a resource:		**54.6%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators				
	Apparent Losses per as percent of system input volume:		**0.9%**	Total Apparent Losses / Total System Input Volume
	Real losses per service connection per day (when system is pressurized):		**616.88**	Total Real Losses / Number of Service Connections
	Real losses per mile of main per day (when system is pressurized):		**43,074**	Total Real Losses / Length of Mains
	Real losses per service connection per day per psi (when system is pressurized):		**9.95**	Total Real Losses / Number of Service Connections / Average Operating Pressure
	**** Unavoidable Annual Real Losses (UARL):**		**2.11**	UARL estimated using IWA method (See footnote)
	Infrastructure Leakage Index (ILI) [Real Losses/UARL]:		**36.84**	

* **Non-Revenue Water as Percent by Cost:**

(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**25,169.83**
total apparent losses x customer retail unit cost	**4,844.56**
total nonrevenue water x 365 days	**10,955,254.03**
total nonrevenue water per day / total annual cost of operating water system	**17.07%**

** **IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2013:**

length of mains x unit rate for UARL per gal/miles/day/psi	**9,770**
# of service connections x unit rate for UARL per gal/service/day/psi	**18,915.90**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**5,373.84**
add totals	**34,060.20**
total x avg operating pressure	**2,111,732.10**
divide by 1,000,000 to calculate per MG per day	**2.11**

FY 2012 PERFORMANCE INDICATORS

		MG Per Year	MG Per Day	
FINISHED WATER DELIVERED	**Total System Input Volume:**	**54,469**	**149.23**	Plant Pumpage
AUTHORIZED CONSUMPTION	Billed Metered:	14,267.00	39.09	
	Billed Unmetered:	-	0.00	
	Unbilled Metered:	1,295.20	3.55	
	Unbilled Unmetered:	7,120.36	19.51	
	Total Authorized Consumption:	**22,682.56**	**62.14**	
WATER LOSSES				
Apparent Losses				
	Unauthorized Consumption:	0.00	0.00	Theft or illegal use
	Customer Metering Inaccuracies & Leak Adjustments:	428	1.17	3% Customer meter under registration and leak adjustments
	Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
	Total Apparent Losses:	**428**	**1.17**	"Paper loss"
Real Losses				
	Total Real Losses:	**31,358**	**85.91**	Physical loss of water from the distribution system
	TOTAL WATER LOSSES:	**31,786**	**87.09**	Apparent Losses plus Real Losses
SYSTEM DATA				
	Length of Mains:	1,599	1,599	length (miles) of all pipelines except service connections
	Number of Service Connections:	121,435	121,435	number of customers
	Connection Density:	**76**	76	# of connections / length of mains (miles)
(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
	Average Operating Pressure:	62.00	62	psi
COST DATA				
	Total Annual Cost of Operating Water System Per Year:		$ 61,988,096	Total O&M
	Customer Retail Unit Cost Per MG:		$ 3,983.25	Total O&M / Total Consumption Sold (Total Consumption is Billed and Unbilled Metered)
	Short-Term Marginal Production Cost Per MG:		$ 214.65	Energy & Chemicals / Total Finished Water Delivered
PERFORMANCE INDICATORS				
Financial Indicators				
	Non-revenue water as percent by volume:		**73.8%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
	*** Non-revenue water as percent by cost:**		**16.5%**	See footnote for formula
Water Resources Indicators				
	Inefficiency of use of water as a resource:		**57.6%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators				
	Apparent Losses per as percent of system input volume:		**0.8%**	Total Apparent Losses / Total System Input Volume
	Real losses per service connection per day (when system is pressurized):		**707.49**	Total Real Losses / Number of Service Connections
	Real losses per mile of main per day (when system is pressurized):		**53,730**	Total Real Losses / Length of Mains
	Real losses per service connection per day per psi (when system is pressurized):		**11.41**	Total Real Losses / Number of Service Connections / Average Operating Pressure
	**** Unavoidable Annual Real Losses (UARL):**		**1.99**	UARL estimated using IWA method (See footnote)
	Infrastructure Leakage Index (ILI) [Real Losses/UARL]:		**43.25**	

* **Non-Revenue Water as Percent by Cost:**

(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**23,390.31**
total apparent losses x customer retail unit cost	**4,670.88**
total nonrevenue water x 365 days	**10,242,331.32**
total nonrevenue water per day / total annual cost of operating water system	**16.52%**

** **IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2012:**

length of mains x unit rate for UARL per gal/miles/day/psi	**8,651**
# of service connections x unit rate for UARL per gal/service/day/psi	**18,215.25**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**5,174.79**
add totals	**32,040.63**
total x avg operating pressure	**1,986,518.87**
divide by 1,000,000 to calculate per MG per day	**1.99**

FY 2011 PERFORMANCE INDICATORS

		Per Year (MG)	Per Day	
FINISHED WATER DELIVERED	**Total System Input Volume:**	**55,151**	**151.10**	Plant Pumpage
AUTHORIZED CONSUMPTION	Billed Metered:	14,629.00	40.08	
	Billed Unmetered:	-	0.00	
	Unbilled Metered:	1,422.50	3.90	
	Unbilled Unmetered:	7,206.84	19.74	
	Total Authorized Consumption:	**23,258.34**	**63.72**	
WATER LOSSES				
Apparent Losses				
	Unauthorized Consumption:	0.00	0.00	Theft or illegal use
	Customer Metering Inaccuracies & Leak Adjustments:	439	1.20	3% Customer meter under registration and leak adjustments
	Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
	Total Apparent Losses:	**439**	**1.20**	"Paper loss"
Real Losses				
	Total Real Losses:	**31,454**	**86.17**	Physical loss of water from the distribution system
	TOTAL WATER LOSSES:	**31,893**	**87.38**	Apparent Losses plus Real Losses
SYSTEM DATA				
	Length of Mains:	1,519	1,519	length (miles) of all pipelines except service connections
	Number of Service Connections:	118,745	118,745	number of customers
	Connection Density:	**78**	78	# of connections / length of mains (miles)
(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
	Average Operating Pressure:	62.00	62	psi
COST DATA				
	Total Annual Cost of Operating Water System Per Year:		$ 64,677,227	Total O&M
	Customer Retail Unit Cost Per MG:		$ 4,029.36	Total O&M / Total Consumption Sold (Total Consumption is Billed and Unbilled Metered)
	Short-Term Marginal Production Cost Per MG:		$ 216.86	Energy & Chemicals / Total Finished Water Delivered
PERFORMANCE INDICATORS				
Financial Indicators				
	Non-revenue water as percent by volume:		**73.5%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
	*** Non-revenue water as percent by cost:**		**16.2%**	See footnote for formula
Water Resources Indicators				
	Inefficiency of use of water as a resource:		**57.0%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators				
	Apparent Losses per as percent of system input volume:		**0.8%**	Total Apparent Losses / Total System Input Volume
	Real losses per service connection per day (when system is pressurized):		**725.71**	Total Real Losses / Number of Service Connections
	Real losses per mile of main per day (when system is pressurized):		**56,731**	Total Real Losses / Length of Mains
	Real losses per service connection per day per psi (when system is pressurized):		**11.71**	Total Real Losses / Number of Service Connections / Average Operating Pressure
	**** Unavoidable Annual Real Losses (UARL):**		**1.93**	UARL estimated using IWA method (See footnote)
	Infrastructure Leakage Index (ILI) [Real Losses/UARL]:		**44.71**	

* **Non-Revenue Water as Percent by Cost:**

(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**23,815.29**
total apparent losses x customer retail unit cost	**4,844.83**
total nonrevenue water x 365 days	**10,460,945.02**
total nonrevenue water per day / total annual cost of operating water system	**16.17%**

** **IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2011:**

length of mains x unit rate for UARL per gal/miles/day/psi	**8,218**
# of service connections x unit rate for UARL per gal/service/day/psi	**17,811.75**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**5,060.16**
add totals	**31,089.70**
total x avg operating pressure	**1,927,561.17**
divide by 1,000,000 to calculate per MG per day	**1.93**

FY 2010 PERFORMANCE INDICATORS

		MG Per Year	MG Per Day	
FINISHED WATER DELIVERED	**Total System Input Volume:**	**52,264**	**143.19**	Plant Pumpage
AUTHORIZED CONSUMPTION	Billed Metered:	15,015.00	41.14	
	Billed Unmetered:	-	0.00	
	Unbilled Metered:	1,744.40	4.78	
	Unbilled Unmetered:	6,861.80	18.80	
	Total Authorized Consumption:	**23,621.20**	**64.72**	
WATER LOSSES				
Apparent Losses				
	Unauthorized Consumption:	0.00	0.00	Theft or illegal use
	Customer Metering Inaccuracies & Leak Adjustments:	450	1.23	3% Customer meter under registration and leak adjustments
	Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
	Total Apparent Losses:	**450**	**1.23**	"Paper loss"
Real Losses				
	Total Real Losses:	**28,192**	**77.24**	Physical loss of water from the distribution system
	TOTAL WATER LOSSES:	**28,643**	**78.47**	Apparent Losses plus Real Losses
SYSTEM DATA				
	Length of Mains:	1,590	1,590	length (miles) of all pipelines except service connections
	Number of Service Connections:	109,640	109,640	number of customers
	Connection Density:	**69**	69	# of connections / length of mains (miles)
(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
	Average Operating Pressure:	62.00	62	psi
COST DATA				
	Total Annual Cost of Operating Water System Per Year:		$ 53,161,832	Total O&M
	Customer Retail Unit Cost Per MG:		$ 3,172.06	Total O&M / Total Consumption Sold (Total Consumption is Billed and Unbilled Metered)
	Short-Term Marginal Production Cost Per MG:		$ 251.88	Energy & Chemicals / Total Finished Water Delivered
PERFORMANCE INDICATORS				
Financial Indicators				
	Non-revenue water as percent by volume:		**71.3%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
	*** Non-revenue water as percent by cost:**		**20.1%**	See footnote for formula
Water Resources Indicators				
	Inefficiency of use of water as a resource:		**53.9%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators				
	Apparent Losses per as percent of system input volume:		**0.9%**	Total Apparent Losses / Total System Input Volume
	Real losses per service connection per day (when system is pressurized):		**704.48**	Total Real Losses / Number of Service Connections
	Real losses per mile of main per day (when system is pressurized):		**48,565**	Total Real Losses / Length of Mains
	Real losses per service connection per day per psi (when system is pressurized):		**11.36**	Total Real Losses / Number of Service Connections / Average Operating Pressure
	**** Unavoidable Annual Real Losses (UARL):**		**1.84**	UARL estimated using IWA method (See footnote)
	Infrastructure Leakage Index (ILI) [Real Losses/UARL]:		**41.91**	

* **Non-Revenue Water as Percent by Cost:**

(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**25,394.29**
total apparent losses x customer retail unit cost	**3,914.67**
total nonrevenue water x 365 days	**10,697,769.69**
total nonrevenue water per day / total annual cost of operating water system	**20.12%**

** **IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2010:**

length of mains x unit rate for UARL per gal/miles/day/psi	**8,604**
# of service connections x unit rate for UARL per gal/service/day/psi	**16,446.00**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**4,672.16**
add totals	**29,722.46**
total x avg operating pressure	**1,842,792.25**
divide by 1,000,000 to calculate per MG per day	**1.84**

FY 2009 PERFORMANCE INDICATORS

		MG Per Year	MG Per Day	
FINISHED WATER DELIVERED	**Total System Input Volume:**	**54,451**	**149.18**	Plant Pumpage
AUTHORIZED CONSUMPTION	Billed Metered:	13,504.00	37.00	
	Billed Unmetered:	-	0.00	
	Unbilled Metered:	971.80	2.66	
	Unbilled Unmetered:	7,083.86	19.41	
	Total Authorized Consumption:	**21,559.66**	**59.07**	
WATER LOSSES				
Apparent Losses				
	Unauthorized Consumption:	0.00	0.00	Theft or illegal use
	Customer Metering Inaccuracies:	405.12	1.11	Customer meter under registration
	Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
	Total Apparent Losses:	**405.12**	**1.11**	"Paper loss"
Real Losses				
	Total Real Losses:	**32,486.22**	**89.00**	Physical loss of water from the distribution system
	TOTAL WATER LOSSES:	**32,891.34**	**90.11**	Apparent Losses plus Real Losses
SYSTEM DATA				
	Length of Mains:	1,791	1,791	length (miles) of all pipelines except service connections
	Number of Service Connections:	109,640	109,640	number of customers
	Connection Density:	**61**	61	# of connections / length of mains (miles)
(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
	Average Operating Pressure:	62.00	62	psi
COST DATA				
	Total Annual Cost of Operating Water System Per Year:		$ 51,983,969	Total O&M
	Customer Retail Unit Cost Per MG:		$ 3,591.09	Total O&M / Total Consumption Sold (Total Consumption is Billed and Unbilled Metered)
	Short-Term Marginal Production Cost Per MG:		$ 275.14	Energy & Chemicals / Total Finished Water Delivered
PERFORMANCE INDICATORS				
Financial Indicators				
	Non-revenue water as percent by volume:		**75.2%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
	*** Non-revenue water as percent by cost:**		**24.3%**	See footnote for formula
Water Resources Indicators				
	Inefficiency of use of water as a resource:		**59.7%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators				
	Apparent Losses per as percent of system input volume:		**0.7%**	Total Apparent Losses / Total System Input Volume
	Real losses per service connection per day (when system is pressurized):		**811.78**	Total Real Losses / Number of Service Connections
	Real losses per mile of main per day (when system is pressurized):		**49,695**	Total Real Losses / Length of Mains
	Real losses per service connection per day per psi (when system is pressurized):		**13.09**	Total Real Losses / Number of Service Connections / Average Operating Pressure
	**** Unavoidable Annual Real Losses (UARL):**		**1.91**	UARL estimated using IWA method (See footnote)
	Infrastructure Leakage Index (ILI) [Real Losses/UARL]:		**46.60**	

* **Non-Revenue Water as Percent by Cost:**

(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**30,560.51**
total apparent losses x customer retail unit cost	**3,985.82**
total nonrevenue water x 365 days	**12,609,409.84**
total nonrevenue water per day / total annual cost of operating water system	**24.26%**

** **IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2009:**

length of mains x unit rate for UARL per gal/miles/day/psi	**9,689**
# of service connections x unit rate for UARL per gal/service/day/psi	**16,446.00**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**4,672.16**
add totals	**30,807.47**
total x avg operating pressure	**1,910,063.08**
divide by 1,000,000 to calculate per MG per day	**1.91**

FY 2008 PERFORMANCE INDICATORS

			MG Per Year	Per Day	
FINISHED WATER DELIVERED		**Total System Input Volume:**	**52,656**	**144.26**	Plant Pumpage
AUTHORIZED CONSUMPTION		Billed Metered:	13,103.00	35.90	
		Billed Unmetered:	-	0.00	
		Unbilled Metered:	1,599.30	4.38	
		Unbilled Unmetered:	6,880.99	18.85	
		Total Authorized Consumption:	**21,583.29**	**59.13**	
WATER LOSSES					
Apparent Losses					
		Unauthorized Consumption:	0.00	0.00	Theft or illegal use
		Customer Metering Inaccuracies:	393.09	1.08	Customer meter under registration
		Data Handling Errors:	-	0.00	Accounts lacking proper billing (no estimation available)
		Total Apparent Losses:	**393.09**	**1.08**	"Paper loss"
Real Losses					
		Total Real Losses:	**30,679.62**	**84.05**	Physical loss of water from the distribution system
		TOTAL WATER LOSSES:	**31,072.71**	**85.13**	Apparent Losses plus Real Losses
SYSTEM DATA					
		Length of Mains:	1,791	1,791	length (miles) of all pipelines except service connections
		Number of Service Connections:	102,575	102,575	number of customers
		Connection Density:	**57**	57	# of connections / length of mains (miles)
	(pipe length between curbside customer meter or property boundary)	Average Length (feet) of Private Pipe:	30.0	30	length between stop & main (not included in length of main)
		Average Operating Pressure:	62.00	62	psi
COST DATA					
		Total Annual Cost of Operating Water System Per Year:		$ 66,989,084	Total O&M
		Customer Retail Unit Cost Per MG:		$ 4,556.37	Total O&M / Total Consumption Sold (Total Consumption is Billed and Unbilled Metered)
		Short-Term Marginal Production Cost Per MG:		$ 346.48	Energy & Chemicals / Total Finished Water Delivered
PERFORMANCE INDICATORS					
Financial Indicators					
		Non-revenue water as percent by volume:		**75.1%**	Unbilled Metered & Unmetered plus Total Water Losses / Total System Input Volume
		*** Non-revenue water as percent by cost:**		**22.9%**	See footnote for formula
Water Resources Indicators					
		Inefficiency of use of water as a resource:		**58.3%**	Total Real Losses / Total System Input Volume
Operational Efficiency Indicators					
		Apparent Losses per as percent of system input volume:		**0.7%**	Total Apparent Losses / Total System Input Volume
		Real losses per service connection per day (when system is pressurized):		**819.44**	Total Real Losses / Number of Service Connections
		Real losses per mile of main per day (when system is pressurized):		**46,931**	Total Real Losses / Length of Mains
		Real losses per service connection per day per psi (when system is pressurized):		**13.22**	Total Real Losses / Number of Service Connections / Average Operating Pressure
		**** Unavoidable Annual Real Losses (UARL):**		**1.83**	UARL estimated using IWA method (See footnote)
		Infrastructure Leakage Index (ILI) [Real Losses/UARL]:		**46.04**	

* **Non-Revenue Water as Percent by Cost:**

(unbilled metered + unbilled unmetered + total real losses) x short-term marginal production cost	**37,172.58**
total apparent losses x customer retail unit cost	**4,907.02**
total nonrevenue water x 365 days	**15,359,055.14**
total nonrevenue water per day / total annual cost of operating water system	**22.93%**

** **IWA/AWWA Calculation for Unavoidable Annual Real Loss (UARL) for FY2008:**

length of mains x unit rate for UARL per gal/miles/day/psi	**9,689**
# of service connections x unit rate for UARL per gal/service/day/psi	**15,386.25**
(# of service connections x avg length of pipe / 5280 ft/mile) x unit rate per gal/mile/day/psi	**4,371.09**
add totals	**29,446.65**
total x avg operating pressure	**1,825,692.53**
divide by 1,000,000 to calculate per MG per day	**1.83**

SWBNO Detailed Water Audit **FY 2008 - FY2015**
Cost Data

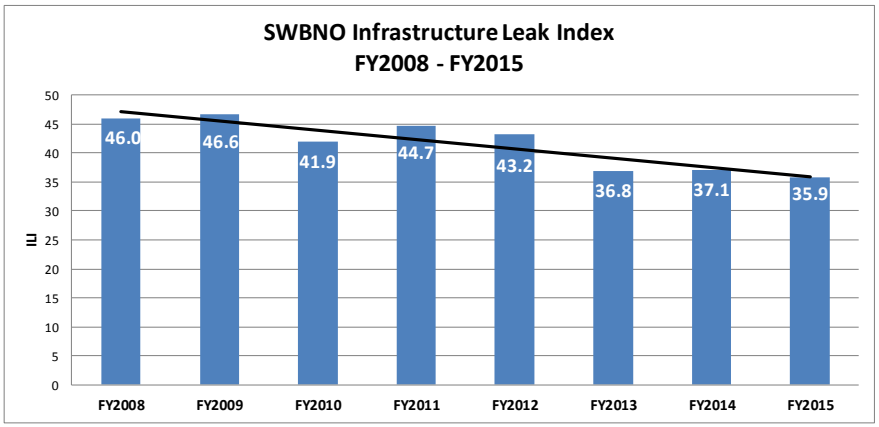
Annual Costs									Source
	FY2015	FY2014	FY2013	FY2012	FY2011	FY2010	FY2009	FY2008	2014 CAFR II-71, Schedule 2, 2013 CAFR II-67, 2012, 2011, 2010 CAFR II-258,
O&M Costs	84,854,293	88,562,278	$64,170,327	$61,988,096	$64,677,227	$53,161,832	$51,983,969	$66,989,084	2009 and 2008 CAFR II-57
Total Chem and Energy	18,135,108	17,155,785	$13,072,012	$11,691,736	$11,960,257	$13,164,393	$14,981,504	$18,244,072	AFIN 880C-13th 2014, 2013, 2012, 2011, 2010, 2009, 2008

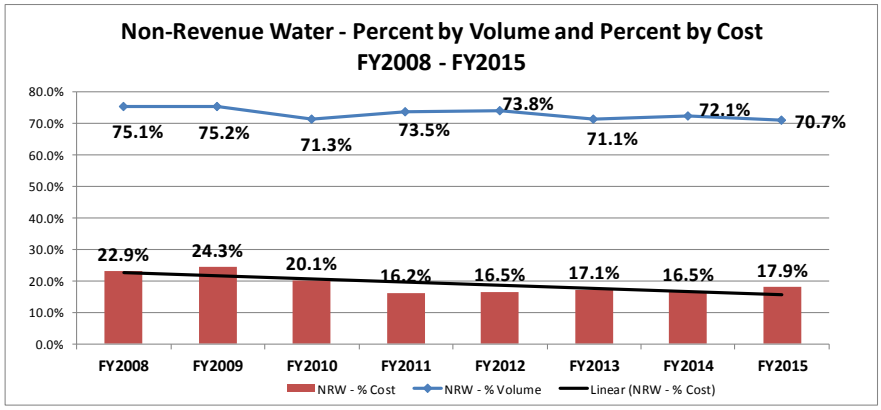
Total Metered Sales Revenue									
	FY2015	FY2014	FY2013	FY2012	FY2011	FY2010	FY2009	FY2008	2014 CAFR II-71, Schedule 2, 2013 CAFR II-67, 2012, 2011, 2010 CAFR II-58,
	78,007,937	70,818,255	$64,398,609	$60,256,304	$59,890,312	$55,079,772	$50,677,054	$43,995,732	2009 and 2008CAFR II-57

Total Consumption									Source
	FY2015	FY2014	FY2013	FY2012	FY2011	FY2010	FY2009	FY2008	
	13,810	13,353	13,600	13,802	14,083	13,745	13,379	13,284	2013 & 2014 CAFR IV-8, 2012, 2011, 2010, 2009, 2008 CAFR IV-9

Revenue / Consumption									Source
	FY2015	FY2014	FY2013	FY2012	FY2011	FY2010	FY2009	FY2008	
	564,866	530,355	473,519	436,577	425,267	400,726	378,781	331,193	Total metered sales revenue / total consumption

SWBNO Detailed Water Audit
ILI and NRW Charts
FY 2008 - FY2015





SWBNO Detailed Water Audit
FY2008 - FY2015
Performance Indicator Summary

PERFORMANCE INDICATOR	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	Change FY15 vs. 08	5 Year AVG FY11-15
Financial Indicators										
Non-Revenue Water as percent by Volume	75.1%	75.2%	71.3%	73.5%	73.8%	71.1%	72.1%	70.7%	-4.4%	72.2%
Non-Revenue Water as percent by Cost	22.9%	24.3%	20.1%	16.2%	16.5%	17.1%	16.5%	17.9%	-5.0%	16.8%
Water Resources Indicators										
Inefficiency of use of Water as a Resource	58.3%	59.7%	53.9%	57.0%	57.6%	54.6%	55.4%	54.2%	-4.1%	55.8%
Operational Efficiency Indicators										
Apparent Losses as % of System Input Volum	0.75%	0.74%	0.86%	0.80%	0.79%	0.87%	0.84%	0.88%	0.1%	0.8%
Real Losses per Service Connection per Day	819.4	811.8	704.5	725.7	707.5	616.9	620.0	597.0	-222.49	653.4
Real losses per Mile of Main per Day	46,931	49,695	48,565	56,731	53,730	43,074	43,752	42,600	-4,331.08	47,977.3
Real Losses per Serv Conn per Day per psi	13.2	13.1	11.4	11.7	11.4	9.9	10.0	9.6	-3.59	10.5
Unavoidable Annual Real Losses (UARL)	1.83	1.91	1.84	1.93	1.99	2.11	2.13	2.16	0.33	2.1
Infrastructure Leakage Index (ILI)	46.0	46.6	41.9	44.7	43.2	36.8	37.1	35.9	-10.17	39.6

WATER CONTRIBUTED DURING 2016 FOR PUBLIC PURPOSES

TYPE	DESCRIPTION	METERED S	UNMETERE ACCOUNTS	GALLONS PROVIDED 2015 CONSUMPTION	GALLONS PROVIDED 2016 CONSUMPTION	DIFFERENCE IN CONSUMPTION	WATER AND SEWER DOLLAR AMT
	MUNICIPAL						
A	FOUNTAIN	**10**		4,357,100	5,181,200	824,100	$51,667.75
B	N.O. FIRE DEPT	**35**	**3**	12,409,600	3,635,100	23,941,500	$183,430.31
C	SWIMMING POOLS	**16**		4,929,500	4,905,000	24,500	$123,413.04
D	LIBRARIES	**20**	**3**	7,060,600	9,411,800	2,351,200	$105,378.70
E	CEMETERIES	**10**		70,800	112,535	41,735	$3,306.53
F	CITY OF N.O.	**59**	**2**	14,006,300	47,671,800	41,735	$294,776.81
G	DEPT OF HEALTH	**9**		395,000	109,820	33,665,500	$23,619.63
H	DEPT OF PROP MGMT	**13**		58,903,100	91,521,700	285,180	$637,183.38
I	SAFETY/PERMITS	**5**		222,100	270,500	32,618,600	$6,552.81
J	SANITATION DEPT	**9**		2,740,400	1,658,700	48,400	$57,078.35
K	PUBLIC WORKS	**19**		2,921,100	1,874,500	1,081,700	$62,597.23
L	DEPT OF WELFARE	**4**		198,200	502,400	1,046,600	$15,782.63
M	MUNICIPAL MISC	**7**		1,504,800	1,533,900	304,200	$43,981.88
TOTALS (MUNICIPAL)		**216**	**8**	109,718,600	168,388,955	29,700	**$1,608,769.05**
PARKS AND PLAYGROUNDS:							
N	CITY PARK	**8**		37,139,800	23,627,600	13,512,200	$308,107.47
O	N.O. MUSEUM OF AR	**1**		205,400	122,900	82,500	$21,806.87
P	AUDUBON PARK	**13**		106,828,100	62,807,000	44,021,100	$75,246.24
Q	PARKS & PARKWAYS	**126**	**4**	55,223,000	74,397,500	19,174,500	$533,687.78
R	NORD	**117**	**3**	44,426,700	95,621,900	51,195,200	$564,801.54
	TOTALS (PARK AND PLAYGROUNDS)	**265**	7			**127,985,500**	**$1,503,649.90**
	POLICE DEPARTMENT:						
S	CRIMINAL SHERIFF	**40**	**6**	91,520,800	162,110,300	70,589,500	$1,131,153.43
T	NOPD	**39**		38,548,100	50,695,300	12,147,200	$441,283.01
	TOTALS (POLICE)	**79**	**6**	130,068,900	212,805,600	82,736,700	$554,436.44
U	SCHOOLS*	**291**	**16**	169,716,400	404,950,900	235,234,500	$2,415,355.69
	GRAND TOTALS	**851**	**37**	653,326,900	1,087,139,000	433,812,100	$4,542,228.57

DOLLAR VALUE OF FREE WATER ACCOUNTS: **$ 2,289,631.00**

TOTAL VALUE OF FREE SEWERAGE ACCOUNTS: **$ 3,596,783.00**

TOTAL VALUE OF FREEE WATER AND SEWERAGE ACCOUNTS: **$ 6,082,211.08**

WATER USED IN PROCESS BY SEWERAGE AND WATER BOARD

	METERED ACCOUNTS	GALLONS PROVIDED 2015	GALLONS PROVIDED 2016	DIFFERENCE DECREASE
SEWERAGE & WATER BOARD	237	645,333,500	532,233,700	113,099,800

DOLLAR VALUE OF WATER AND SEWER USED IN PROCESS

$5,682,198.58

YEAR-T0-YEAR COMPARISON OF WATER USAGE

FREE WATER:

City Agencies (EXCLUDING SCHOOLS)	TOTAL 2015	483,610,500
	TOTAL 2016	682,188,100
		198,577,600
	29%	INCREASE
S&WB Process Water	TOTAL 2015	645,333,500
	TOTAL 2016	532,233,700
		113,099,800
	18% Difference	DECREASE

WATER CAP ACCOUNTS

		Dollar Value* of Water and Sewer Quantity Provided Free of Charge
	City Park:	
Cap Amount	235,323,400	$308,107.47
Water Provided	33,610,400	
Amount Under Cap	201,713,000	
	Audubon Park:	
Cap Amount	240,000,000	$75,246.24
Water Provided	107,929,200	
Amount Under Cap	132,070,800	
	Museum Of Art:	
Cap Amount	2,553,800	$21,806.87
Water Provided	403,729	
Amount Under Cap	2,028,500	

The above listed "water cap" accounts pay only for the water and sewerage service charges and water and sewerage quantity charges that exceed the "cap" amount.

*The dollar values listed are the values of the free water quantity charges actually provided to the agencies.

P&PRECAP2016

Sewerage and Water Board of New Orleans
Calls Abandoned by Customers as a Percentage of Total

Constituency:
Customer Ratepayers

Objective: Provide Timely Information and Respond Promptly to Requests

Goal: Respond to calls with less than 10% abandoned

Currently Meeting Goal: No

Process Operating Within Control Limits: No

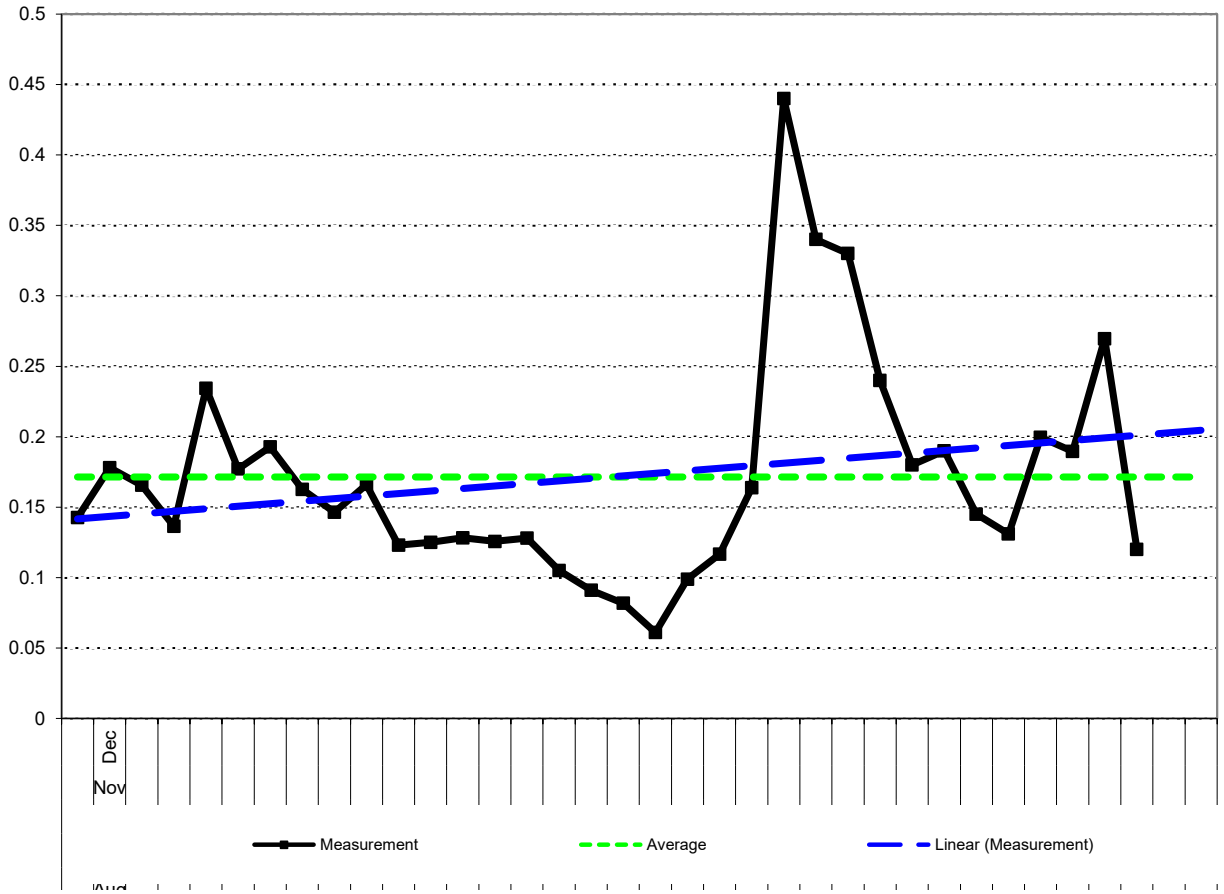
Trend: Unfavorable

Analysis

Customers abandon their calls after waiting for an amount of time considered inconvenient, which varies from customer to customer. Some portion of the volume of abandoned calls is from customers calling and hanging up on multiple occasions.

Plans for Improvement

Abandoned calls have returned to near historical levels following implementation of the new billing system.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	14.3%	17.8%	16.6%	13.7%	23.4%	17.7%	19.3%	16.3%	14.7%	16.6%	12.3%	12.5%
2016	12.8%	12.6%	12.8%	10.5%	9.1%	8.2%	6.1%	9.9%	11.7%	16.4%	44.0%	34.0%
2017	33.0%	24.0%	18.0%	19.0%	14.5%	13.1%	19.9%	19.0%	27.0%	12.0%		

Sewerage and Water Board of New Orleans
Total Accounts Turned Off for Non-Payment

Constituency: Customer Ratepayers

Objective: Ensure Collection of Payments for Services Provided

Goal: None Established

Currently Meeting Goal: Not Applicable

Process Operating Within Control Limits: Yes

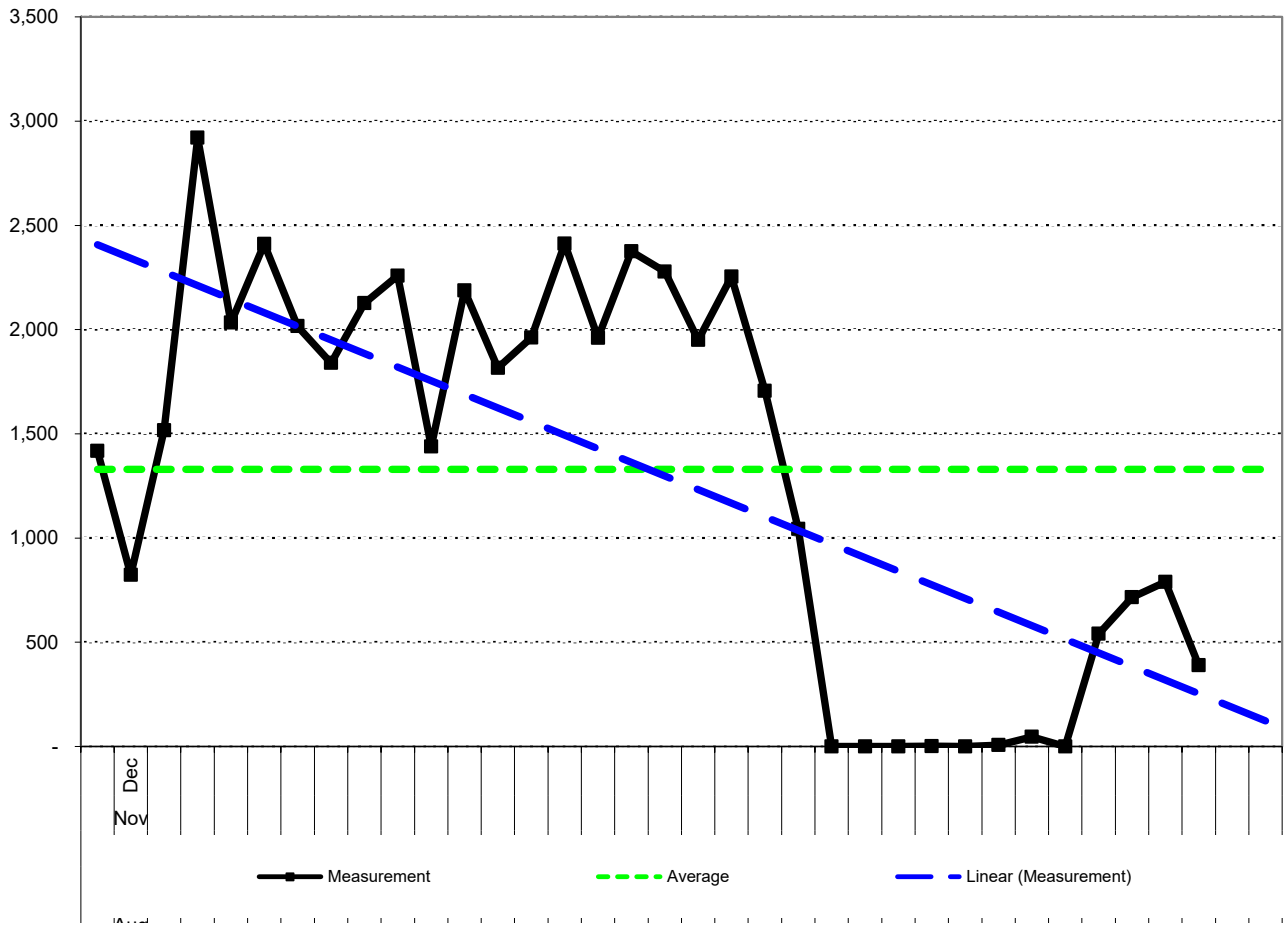
Trend: Stable

Analysis

Customers accounts are turned-off for non-payment for balances more than $50 and over sixty days past due. Turn-offs were temporarily suspended following go-live on the new system.

Plans for Improvement

Non-payment turnoffs was be resumed on July 24, 2017 at a pace of approximately 50 accounts per day after contacting delinquent customers by mail and by phone.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	1,417	823	1,517	2,920	2,033	2,411	2,016	1,840	2,126	2,258	1,439	2,187
2016	1,816	1,962	2,412	1,960	2,375	2,278	1,950	2,254	1,706	1,043	-	-
2017	-	-	-	6	46	-	540	715	789	390	-	-

Sewerage and Water Board of New Orleans
Bills Adjusted as a Percentage of Total Bills Computed

Constituency:
Customer Ratepayers

Objective: Provide Accurate Bills

Goal: Reduce percentage over time

Currently Meeting Goal: Yes

Process Operating Within Control Limits: Yes

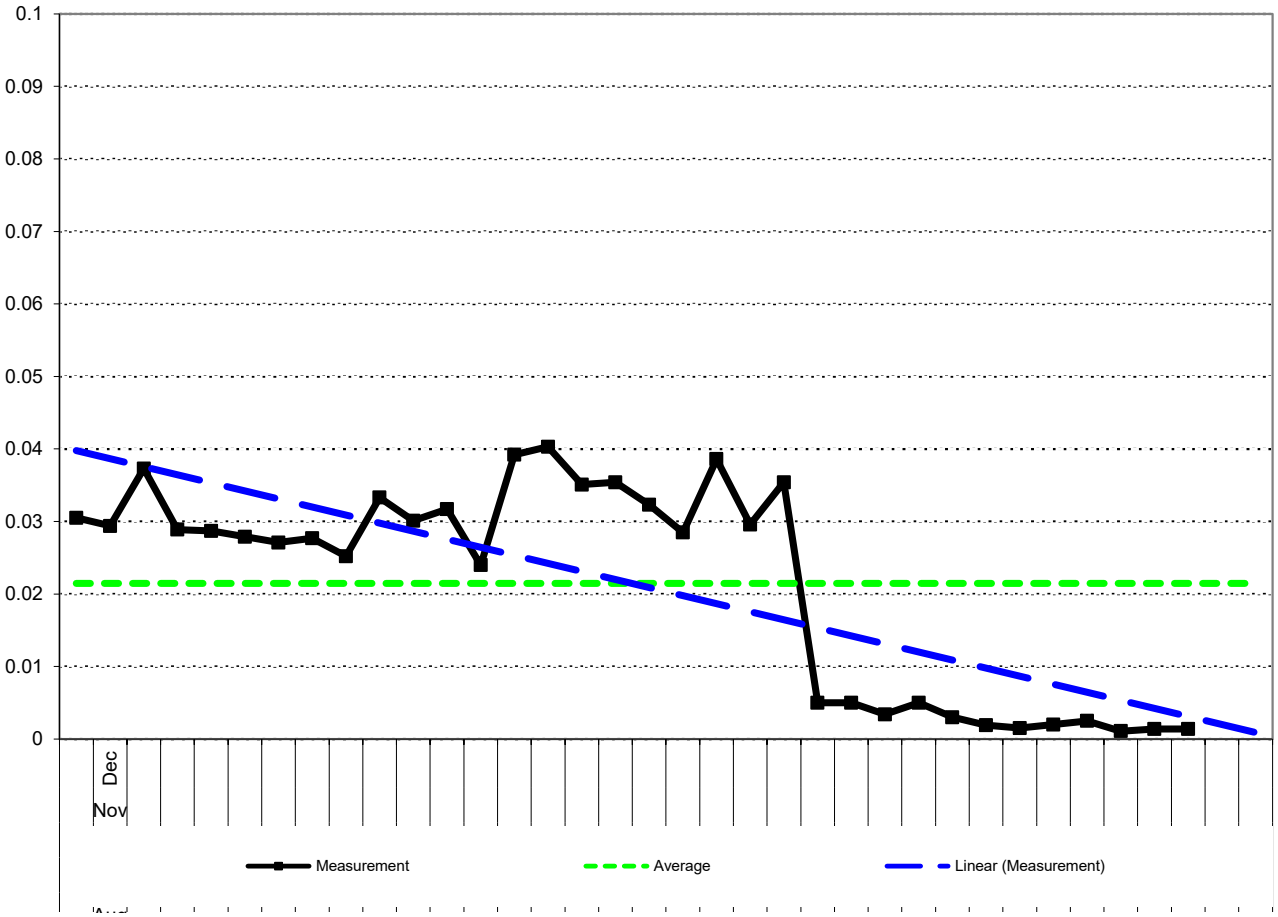
Trend: Favorable

Analysis

Customers request adjustments to their bill due to higher than normal amounts. The higher billed amount may be due to: a leak; one or more estimated readings followed by an actual reading; an erroneous meter reading; or increased water, sewer, or sanitation rates. Before an adjustment can be made, an inspection of the meter and service line must be performed.

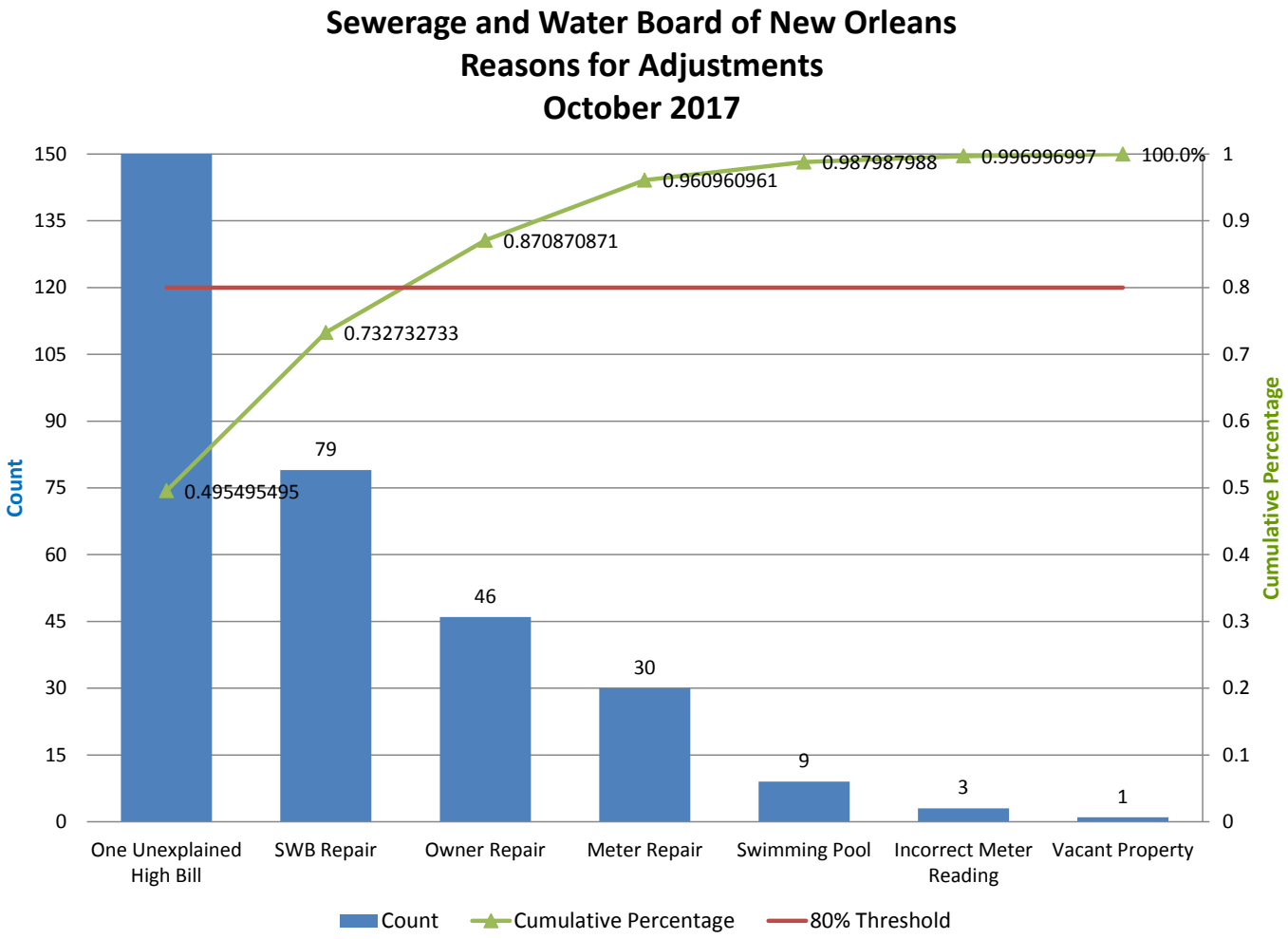
Plans for Improvement

Adjustments have reduced sharply following implementation of the new billing sysem as a result of the ability to correct a bill by cancelling and rebilling rather than by adjustment.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	3.1%	2.9%	3.7%	2.9%	2.9%	2.8%	2.7%	2.8%	2.5%	3.3%	3.0%	3.2%
2016	2.4%	3.9%	4.0%	3.5%	3.5%	3.2%	2.9%	3.9%	3.0%	3.5%	0.5%	0.5%
2017	0.3%	0.5%	0.3%	0.2%	0.2%	0.2%	0.3%	0.1%	0.1%	0.1%		


Sewerage and Water Board of New Orleans
Reasons for Adjustments
October 2017
Count
Cumulative Percentage
150
135
120
105
90
75
60
45
30
15
0
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
79
46
30
9
3
1
0.495495495
0.732732733
0.870870871
0.960960961
0.987987988
0.996996997
100.0%
One Unexplained High Bill
SWB Repair
Owner Repair
Meter Repair
Swimming Pool
Incorrect Meter Reading
Vacant Property
Count
Cumulative Percentage
80% Threshold

Sewerage and Water Board of New Orleans
Average Call Wait Time for Calls Abandoned

Constituency: Customer Ratepayers

Objective: Provide Accurate Bills

Goal: Reduce over time

Currently Meeting Goal: Yes

Process Operating Within Control Limits: Yes

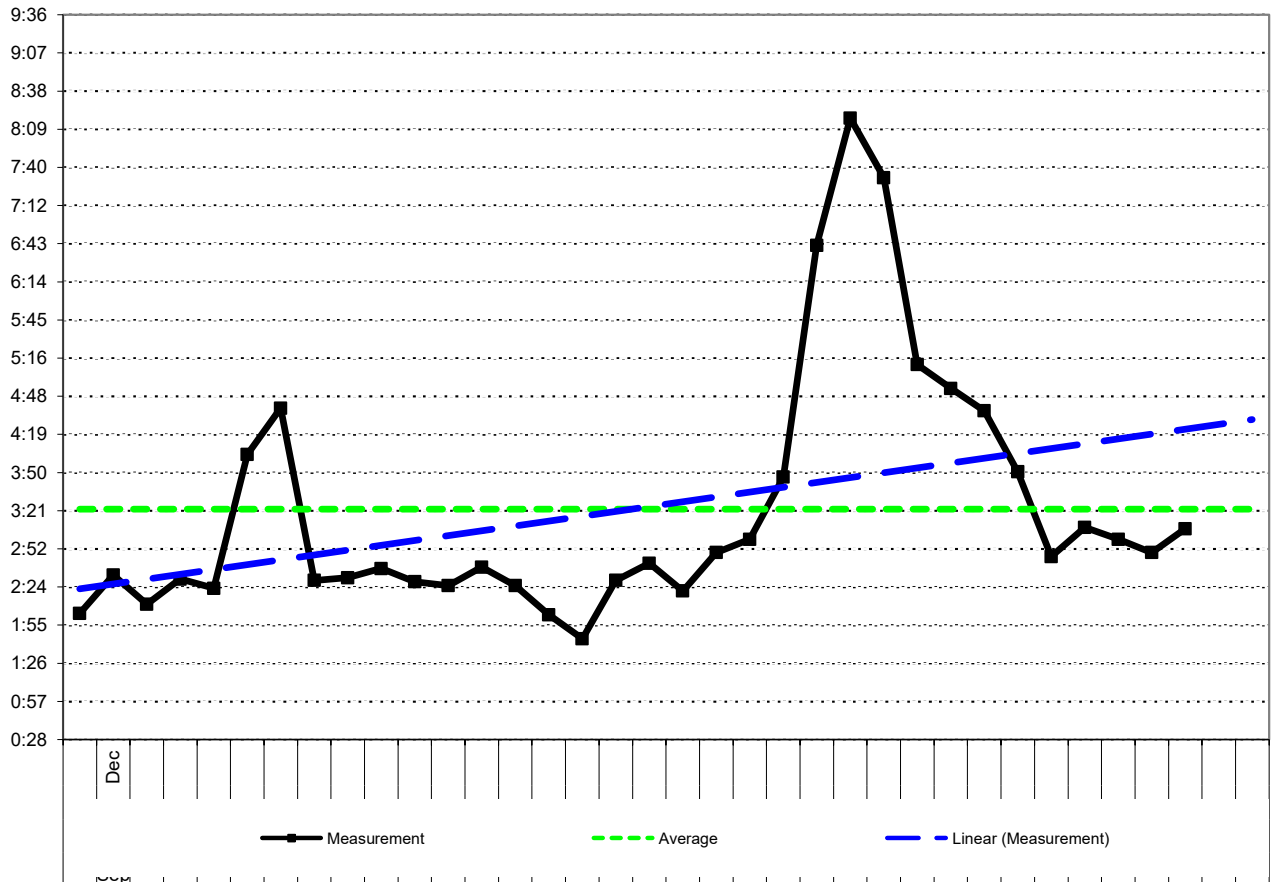
Trend: Favorable

Analysis

Customers contact the Sewerage and Water Board to start or end service; to request information about their bill; to report concerns about their water service, sewer connection, street flooding, or solid waste sanitation service; and other matters. The Call Center for emergency repairs is operated continously, while the Call Center for billing and non-emergency issues is operated from 7 AM to 7 PM. Call volumes can vary significantly month to month.

Plans for Improvement

Interactive voice response capabilities were implemented in October 2016 with the intent to reduce the volume of calls requiring Call Center assistance. We have provided customers with the opportunity to leave their contact information at a link on our website so that we can call them back during non-peak times.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	2:04	2:33	2:11	2:30	2:23	4:04	4:39	2:29	2:31	2:38	2:28	2:25
2016	2:39	2:25	2:03	1:45	2:29	2:42	2:21	2:50	3:00	3:47	6:42	8:18
2017	7:33	5:12	4:54	4:37	3:51	2:47	3:09	3:00	2:50	3:08		

Sewerage and Water Board of New Orleans
Average Call Wait Time for Calls Answered

Constituency:
Customer Ratepayers

Objective: Provide Accurate Bills

Goal: Reduce over time

Currently Meeting Goal: No

Process Operating Within Control Limits: Yes

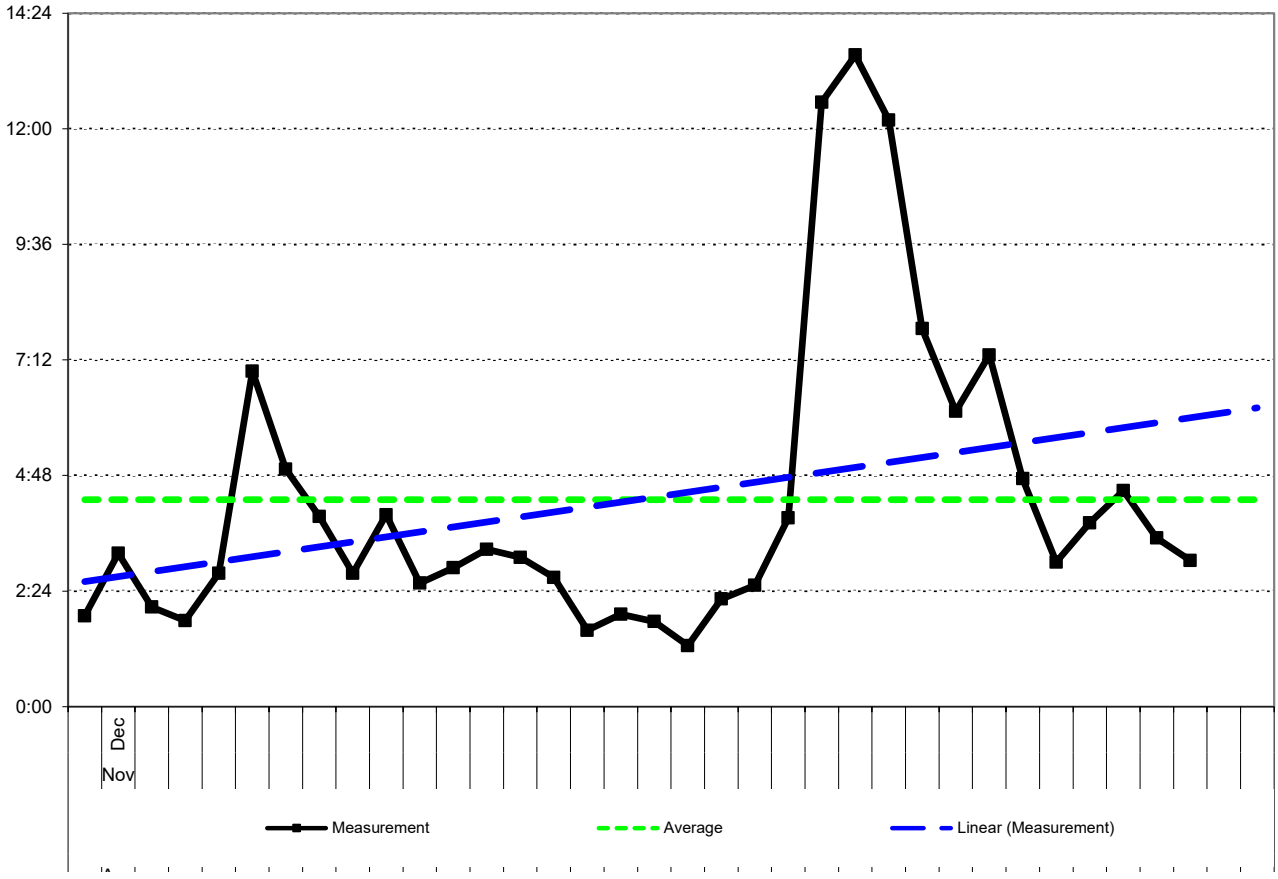
Trend: Unfavorable

Analysis

Customers contact the Sewerage and Water Board to start or end service; to request information about their bill; to report concerns about their water service, sewer connection, street flooding, or solid waste sanitation service; and other matters. The Call Center for emergency repairs is operated continously, while the Call Center for billing and non-emergency issues is operated from 7 AM to 7 PM. Call volumes can vary significantly month to month. Call wait times have increased sharply while training and implementation for the new billing system occurs.

Plans for Improvement

Interactive voice response capabilities were implemented in October 2016 with the intent to reduce the volume of calls requiring Call Center assistance. We have provided customers with the opportunity to leave their contact information at a link on our website so that we can call them back during non-peak times..



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	1:53	3:11	2:04	1:47	2:46	6:58	4:56	3:57	2:46	3:59	2:34	2:53
2016	3:16	3:06	2:41	1:35	1:55	1:46	1:16	2:14	2:31	3:55	12:33	13:32
2017	12:11	7:51	6:08	7:18	4:44	3:00	3:49	4:29	3:30	3:02		

Sewerage and Water Board of New Orleans
Total Inbound Customer Contacts

Constituency: Customer Ratepayers

Objective: Provide Timely Information and Respond Promptly to Requests

Goal: Reduce Triggers of Customer Calls

Currently Meeting Goal: Close

Process Operating Within Control Limits: Yes

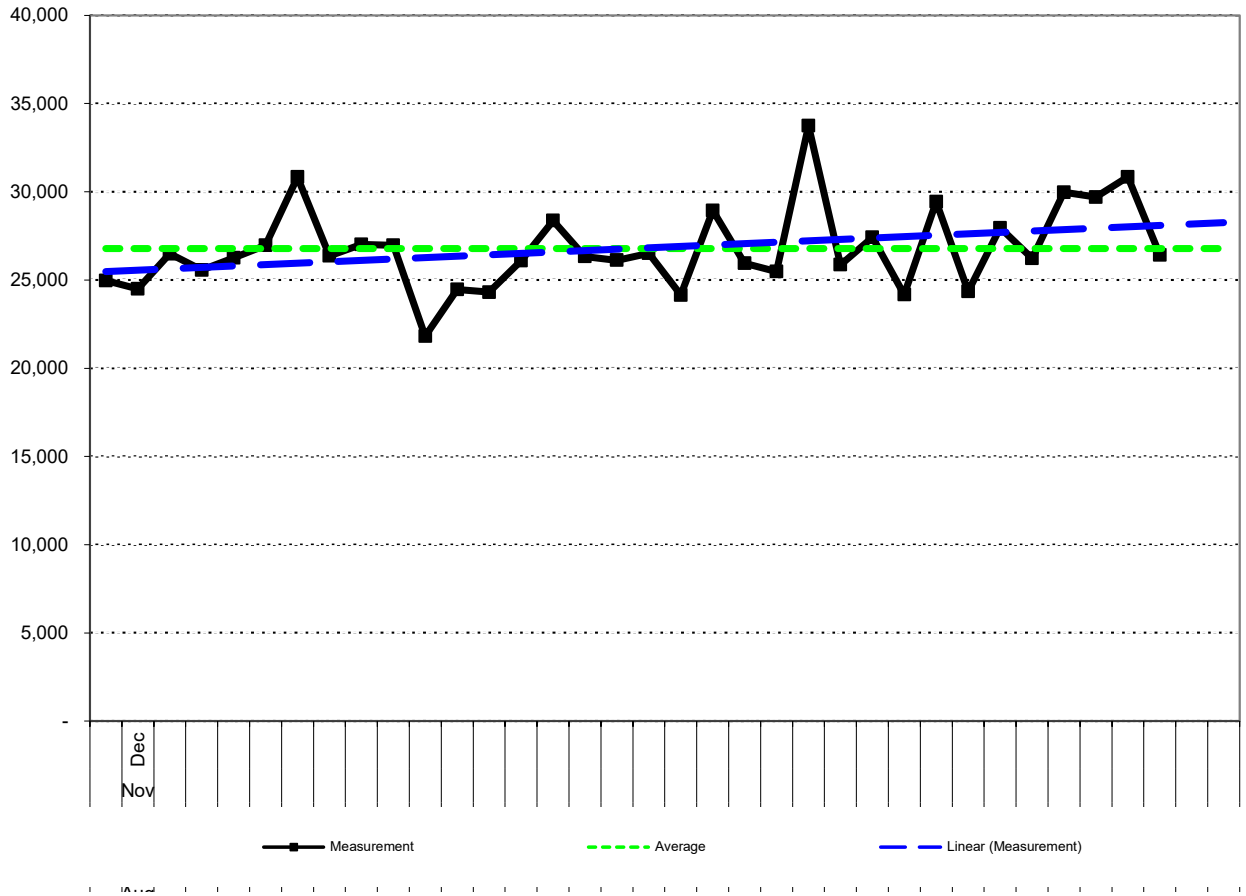
Trend: Unfavorable

Analysis

Customers contact the Sewerage and Water Board to start or end service; to request information about their bill; to report concerns about their water service, sewer connection, street flooding, or solid waste sanitation service; and other matters. The Call Center for emergency repairs is operated continously, while the Call Center for billing and non-emergency issues is operated from 7 AM to 7 PM. Call volumes can vary significantly month to month. Calls increased sharply after go-live on new system.

Plans for Improvement

Engage a consultant to re-engineer the call center processes for receiving and handling calls.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014	24,967	24,496	26,486	25,565	26,261	26,963	30,836	26,368	27,019	26,973	21,816	24,469
2015	24,311	26,089	28,365	26,333	26,121	26,515	24,149	28,942	25,958	25,483	33,746	25,866
2016	27,425	24,169	29,436	24,346	27,955	26,222	29,969	29,698	30,844	26,417		

Sewerage and Water Board of New Orleans

Emergency Calls Abandoned by Customers as a Percentage of Total Emergency Calls

Constituency:
Customer Ratepayers

Objective: Provide Timely Information and Respond Promptly to Requests

Goal: Respond to calls with less than 10% abandoned

Currently Meeting Goal: Yes

Process Operating Within Control Limits: Yes

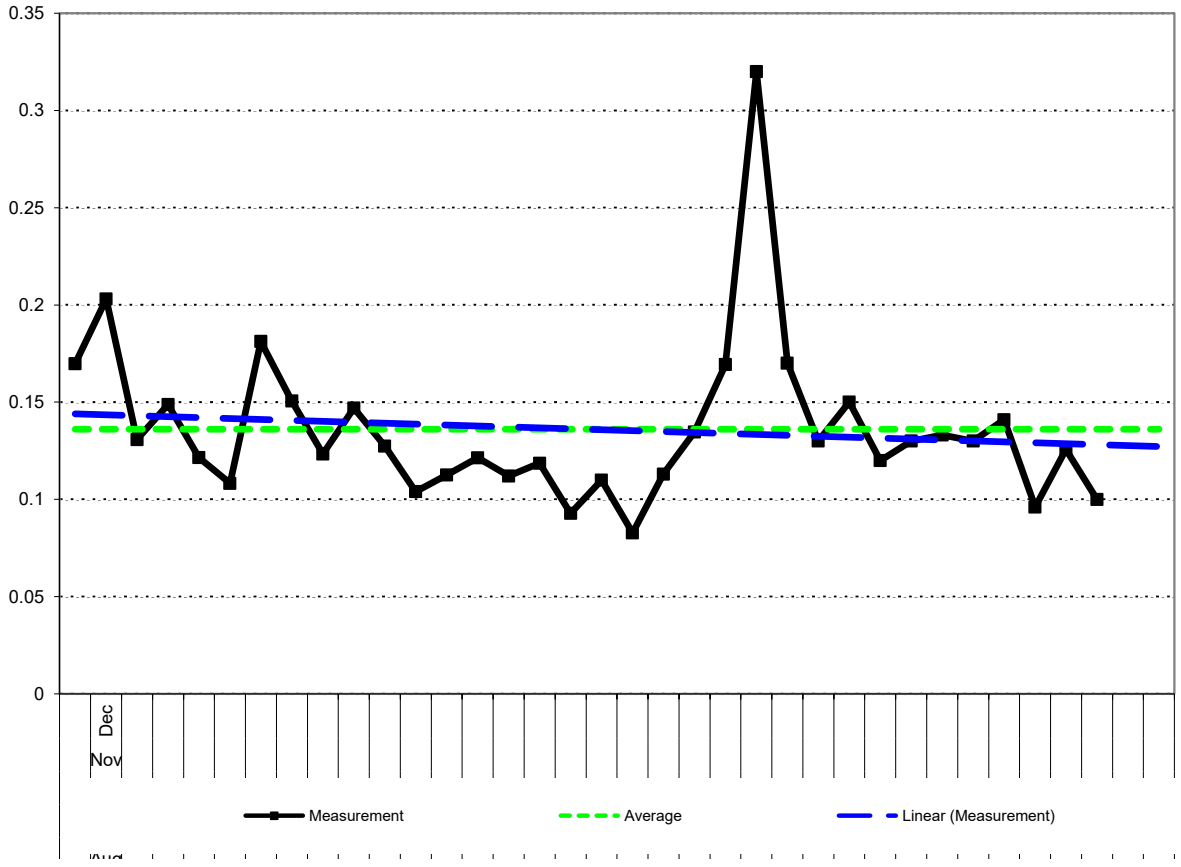
Trend: Level

Analysis

Customers abandon their calls after waiting for an amount of time considered inconvenient, which varies from customer to customer. Some portion of the volume of abandoned calls is from customers calling and hanging up on multiple occasions.

Plans for Improvement

Abandoned calls have returned to near historical levels following implementation of the new billing system.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	17.0%	20.3%	13.1%	14.9%	12.2%	10.8%	18.1%	15.1%	12.3%	14.7%	12.7%	10.4%
2016	11.3%	12.1%	11.2%	11.9%	9.3%	11.0%	8.3%	11.3%	13.5%	16.9%	32.0%	17.0%
2017	13.0%	15.0%	12.0%	13.0%	13.3%	13.0%	14.1%	9.6%	12.6%	10.0%		

Sewerage and Water Board of New Orleans
Bills Estimated as a Percentage of Total Bills

EUM Attribute:
Customer Satisfaction

Description: Provides reliable, responsive, and affordable services in line with explicit, customer-accepted service levels. Receives timely customer feedback to maintain responsiveness to customer needs and emergencies.

Constituency:
Customer Ratepayers

Objective: Provide Accurate Bills

Goal: Bill Accounts With Less Than 2% Estimated

Currently Meeting Goal: No

Process Operating Within Control Limits: No

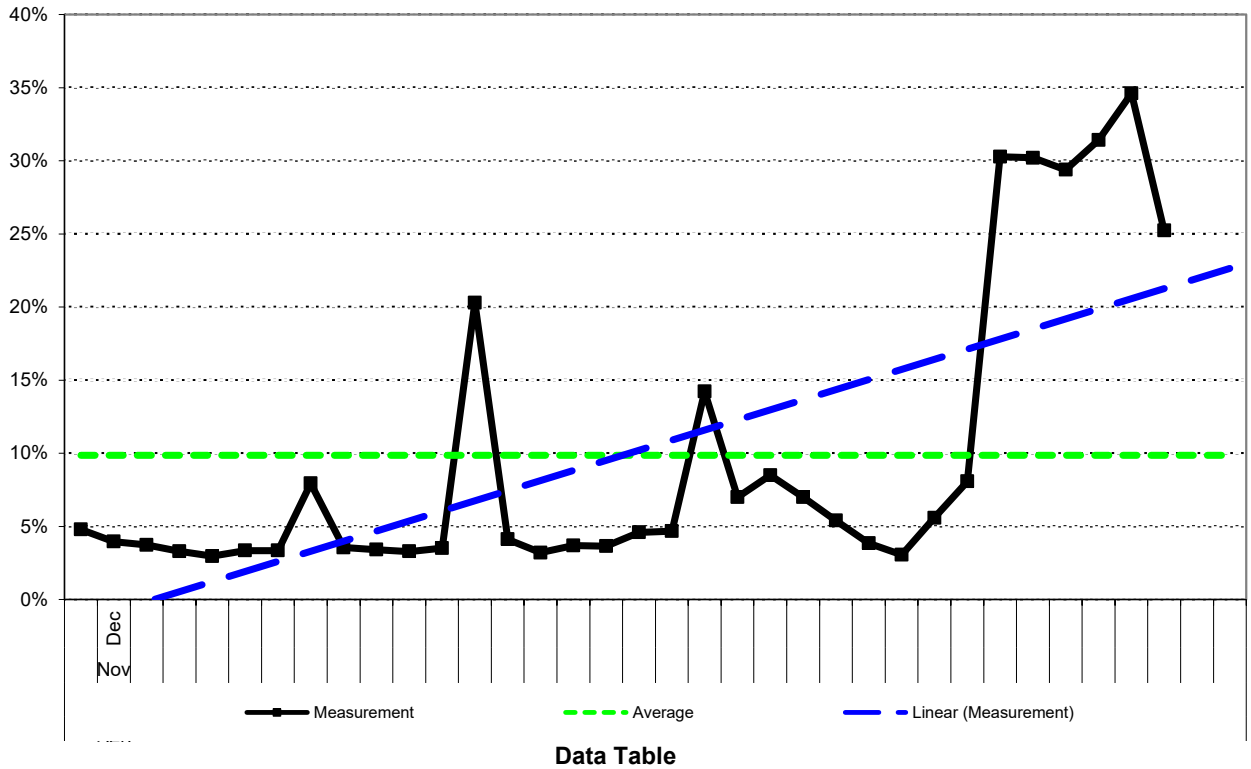
Trend: Unfavorable

Analysis

A bill is estimated if the meter is not read by the designated billing date. Bills are also estimated when a meter is read and the reliability of the reading is doubtful and the account is placed on an exception report. If the reading is not verified by the billing date, the bill will be estimated. Spikes in estimated bills usually occur when the Meter Reading department is unable to read a large section of meters during extreme weather.

Plans for Improvement

Current plans are focused on obtaining readings for accounts each month and verifying the reliability of each reading. Future plans will focus on advanced metering infrastructure that allows for readings to be obtained automatically several times daily.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	4.8%	4.0%	3.7%	3.3%	3.0%	3.4%	3.4%	7.9%	3.6%	3.4%	3.3%	3.5%
2016	20.3%	4.1%	3.2%	3.7%	3.7%	4.6%	4.7%	14.2%	7.0%	8.5%	7.0%	5.4%
2017	3.9%	3.1%	5.6%	8.1%	30.3%	30.2%	29.4%	31.4%	34.6%	25.2%		

Sewerage and Water Board of New Orleans Investigations from High Bill Complaints as a Percentage of Total Bills

Constituency: Customer Ratepayers

Objective: Provide Accurate Bills

Goal: Reduce percentage over time

Currently Meeting Goal: No

Process Operating Within Control Limits: Close

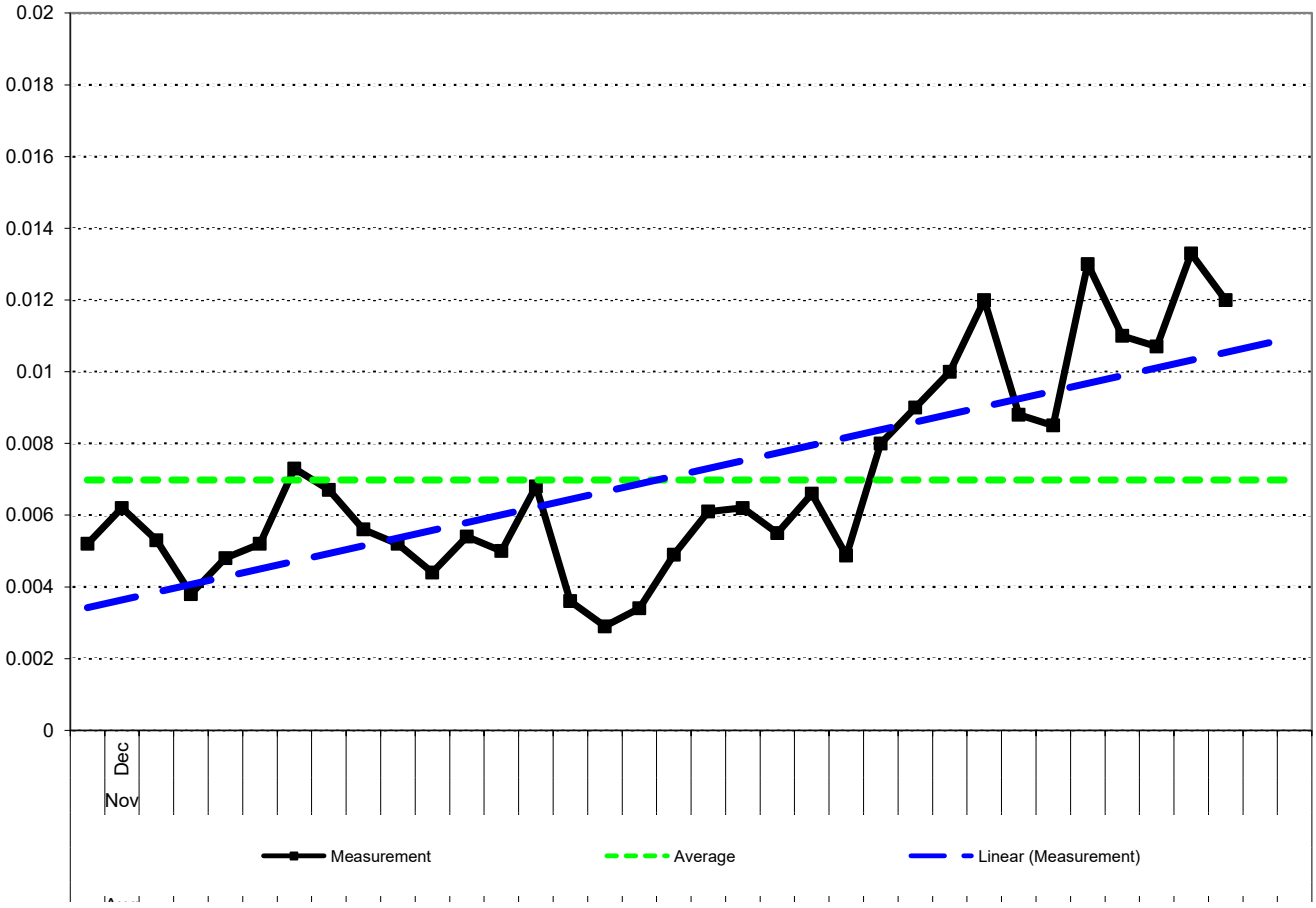
Trend: Unfavorable

Analysis

Customers request an investigation about their usage when the bill is higher than normal amounts. The higher billed amount may be due to: a leak; one or more estimated readings followed by an actual reading; an erroneous meter reading; or increased water, sewer, or sanitation rates. Before an adjustment can be made, an inspection of the meter and service line must be performed.

Plans for Improvement

Staff is working to reduce the number of estimated and erroneous readings. Also, the Automated Meter Reading pilot project is also intended to reduce the number of estimated and erroneous readings, as well as to reduce the cost of obtaining a validated reading.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	0.5%	0.6%	0.5%	0.4%	0.5%	0.5%	0.7%	0.7%	0.6%	0.5%	0.4%	0.5%
2016	0.5%	0.7%	0.4%	0.3%	0.3%	0.5%	0.6%	0.6%	0.6%	0.7%	0.5%	0.8%
2017	0.9%	1.0%	1.2%	0.9%	0.9%	1.3%	1.1%	1.1%	1.3%	1.2%		

Sewerage and Water Board of New Orleans
Total Service Requests about Low Water Pressure

Constituency: Customer Ratepayers

Objective: Provide Timely Information and Respond Promptly to Requests

Goal: Reduce Number of Service Requests

Currently Meeting Goal: Yes

Process Operating Within Control Limits: Yes

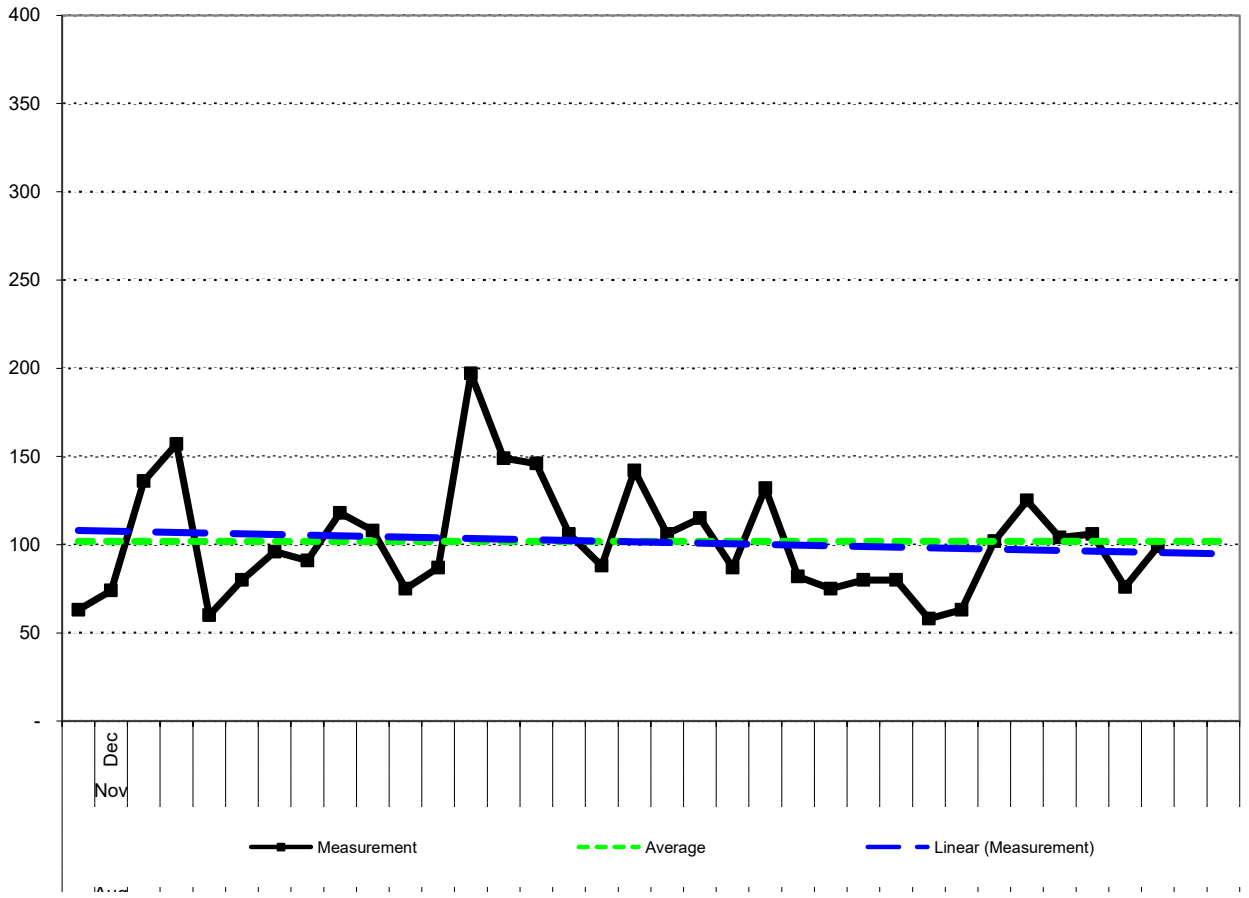
Trend: Favorable

Analysis

Customers contact the Sewerage and Water Board to request resolution to low water pressure. System pressure can be impaired by power failures at the treatment plants, by water main breaks, and by certain types of repair activities.

Plans for Improvement

Staff continues to make repairs to the water system to reduce the number of occasions of low pressure.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	63	74	136	157	60	80	96	91	118	108	75	87
2016	197	149	146	106	88	142	106	115	87	132	82	75
2017	80	80	58	63	102	125	104	106	76	99		

Sewerage and Water Board of New Orleans
Meters Read as a Percentage of Total Meters

Constituency:
Customer Ratepayers

Objective: Provide Accurate Bills

Goal: Read 98% or more of meters each month

Currently Meeting Goal: No

Process Operating Within Control Limits: No

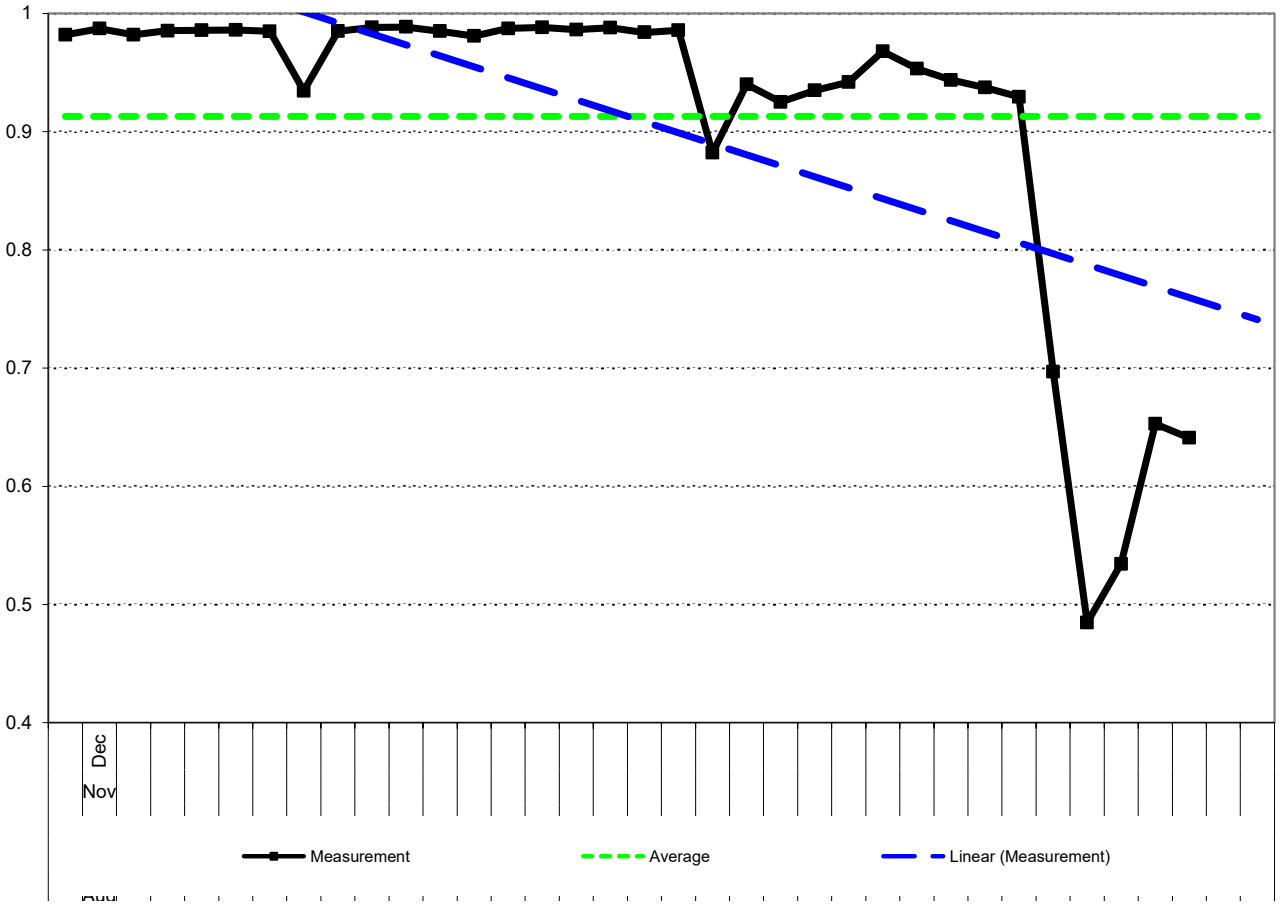
Trend: UnFavorable

Analysis

The purpose of the customer billing and collection processes is to collect revenues from customer accounts that are billed according to the service rules and are based upon accurate metered consumption. Obtaining an accurate reading is the first step in that process. Staff has maintained a reading rate near or above the goal since April 2010 except for three months affected by weather events. Recent reductions in overtime have resulted in an increased number of occasions when entire routes are estimated.

Plans for Improvement

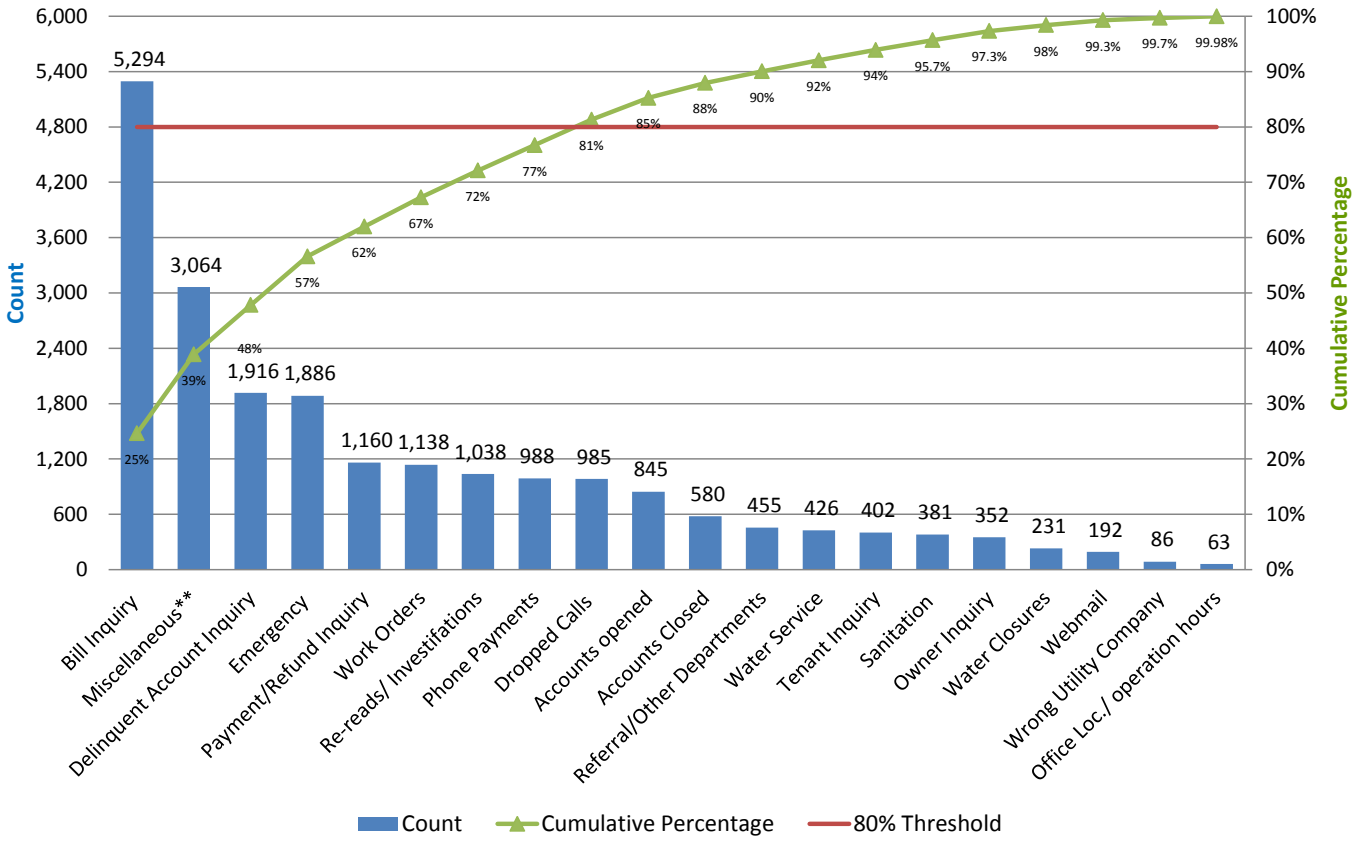
Staff is working to reduce the number of estimated and erroneous readings. Also, the Automated Meter Reading pilot project is also intended to reduce the number of estimated and erroneous readings, as well as to reduce the cost of obtaining a validated reading.

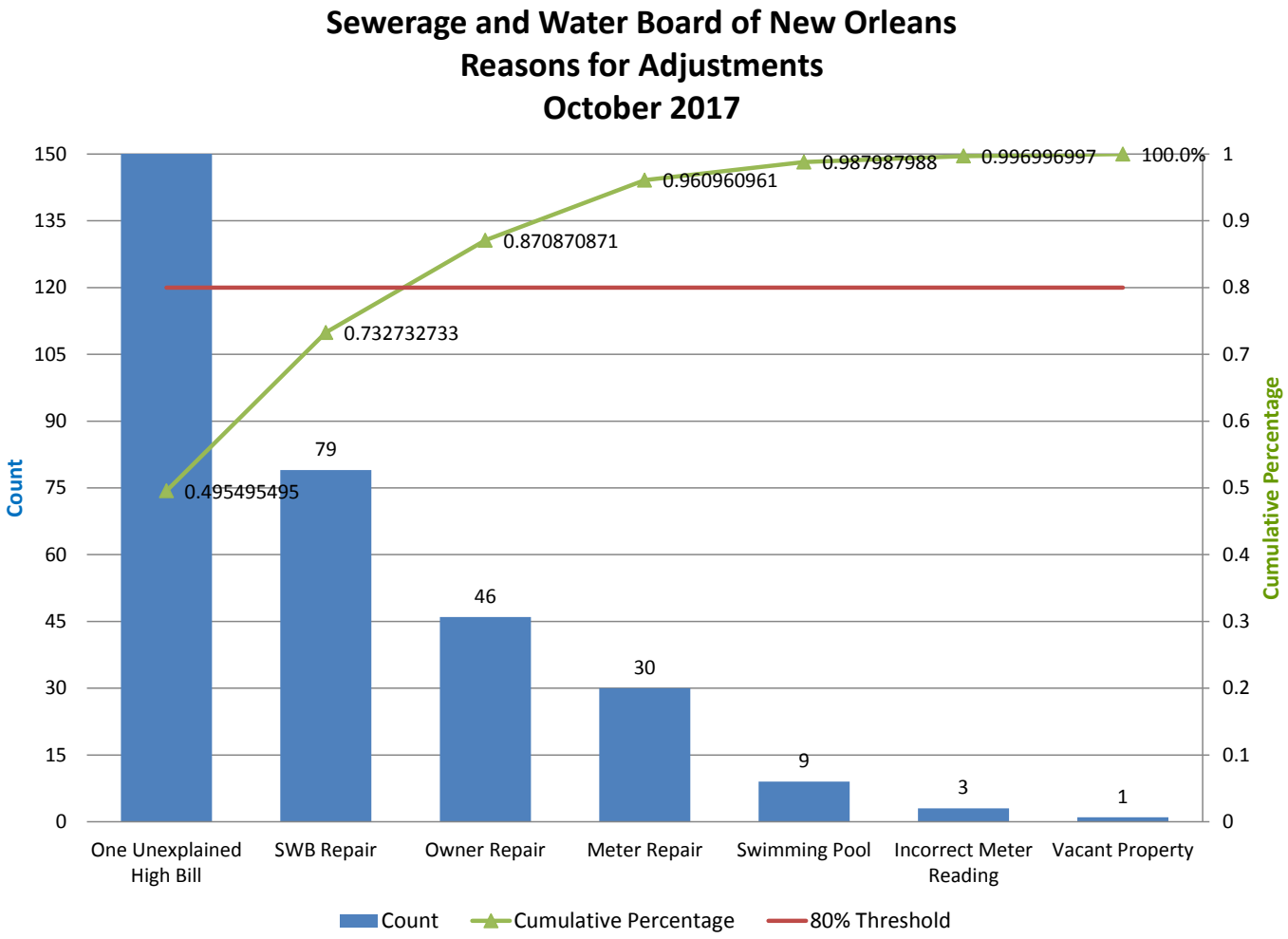


Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	98.2%	98.7%	98.2%	98.5%	98.6%	98.6%	98.5%	93.5%	98.5%	98.8%	98.9%	98.5%
2016	98.1%	98.7%	98.8%	98.6%	98.8%	98.4%	98.6%	88.2%	94.0%	92.5%	93.5%	94.2%
2017	96.8%	95.3%	94.4%	93.7%	93.0%	69.7%	48.5%	53.4%	65.3%	64.1%		

Sewerage and Water Board of New Orleans
Types of Customer Calls
October 2017




Sewerage and Water Board of New Orleans
Reasons for Adjustments
October 2017
Count
Cumulative Percentage
150
135
120
105
90
75
60
45
30
15
0
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
79
46
30
9
3
1
0.495495495
0.732732733
0.870870871
0.960960961
0.987987988
0.996996997
100.0%
One Unexplained High Bill
SWB Repair
Owner Repair
Meter Repair
Swimming Pool
Incorrect Meter Reading
Vacant Property
Count
Cumulative Percentage
80% Threshold

Sewerage and Water Board of New Orleans
Water and Sewer Receivables 30 to 120 Days Old

EUM Attribute: Financial Viability

Description: Establishes and maintains an effective balance between long-term debt, asset values, operations and maintenance expenditures, and operating revenues

Constituency: Customer Ratepayers

Objective: Efficient use of resources in providing services

Goal: None established

Currently Meeting Goal: Not Applicable

Process Operating Within Control Limits: Yes

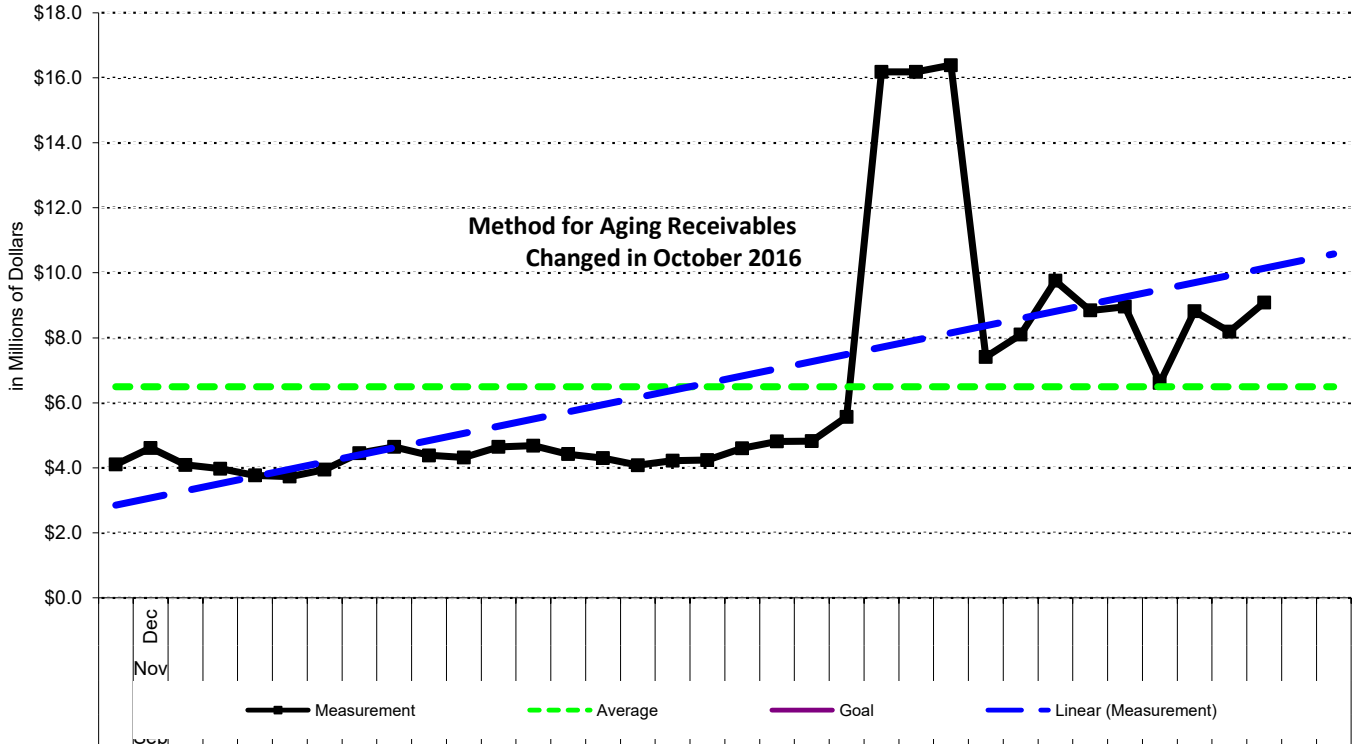
Trend: Method for Aging Receivables Changed in October 2016

Analysis

Water and sewer accounts receivable that are 30 to 120 days old are handled by internal staff using service disconnection. When those accounts are turned-off and final bills sent, the remaining balances after 30 days are sent to a collection agency.

Plans for Improvement

It appears that the higher post-Katrina accounts receivable balances have been resolved through standard collection practices and that annual collection rates now exceed 98% of annual billings. Staff intends to use standard process improvement methods to continue collection practices pending implementation of new billing and collection system.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	$ 4.10	$ 4.61	$ 4.09	$ 3.97	$ 3.77	$ 3.73	$ 3.94	$ 4.45	$ 4.64	$ 4.38	$ 4.32	$ 4.64
2016	$ 4.68	$ 4.42	$ 4.30	$ 4.08	$ 4.22	$ 4.24	$ 4.60	$ 4.81	$ 4.82	$ 5.57	$ 16.18	$ 16.18
2017	$ 16.39	$ 7.41	$ 8.10	$ 9.76	$ 8.84	$ 8.96	$ 6.61	$ 8.82	$ 8.19	$ 9.08		

Sewerage and Water Board of New Orleans
Water and Sewer Receivables 120 Days and Older

EUM Attribute:
Financial Viability

Description: Establishes and maintains an effective balance between long-term debt, asset values, operations and maintenance expenditures, and operating revenues

Constituency:
Customer Ratepayers

Objective: Efficient use of resources in providing services

Goal: None established

Currently Meeting Goal: Not Applicable

Process Operating Within Control Limits: Yes

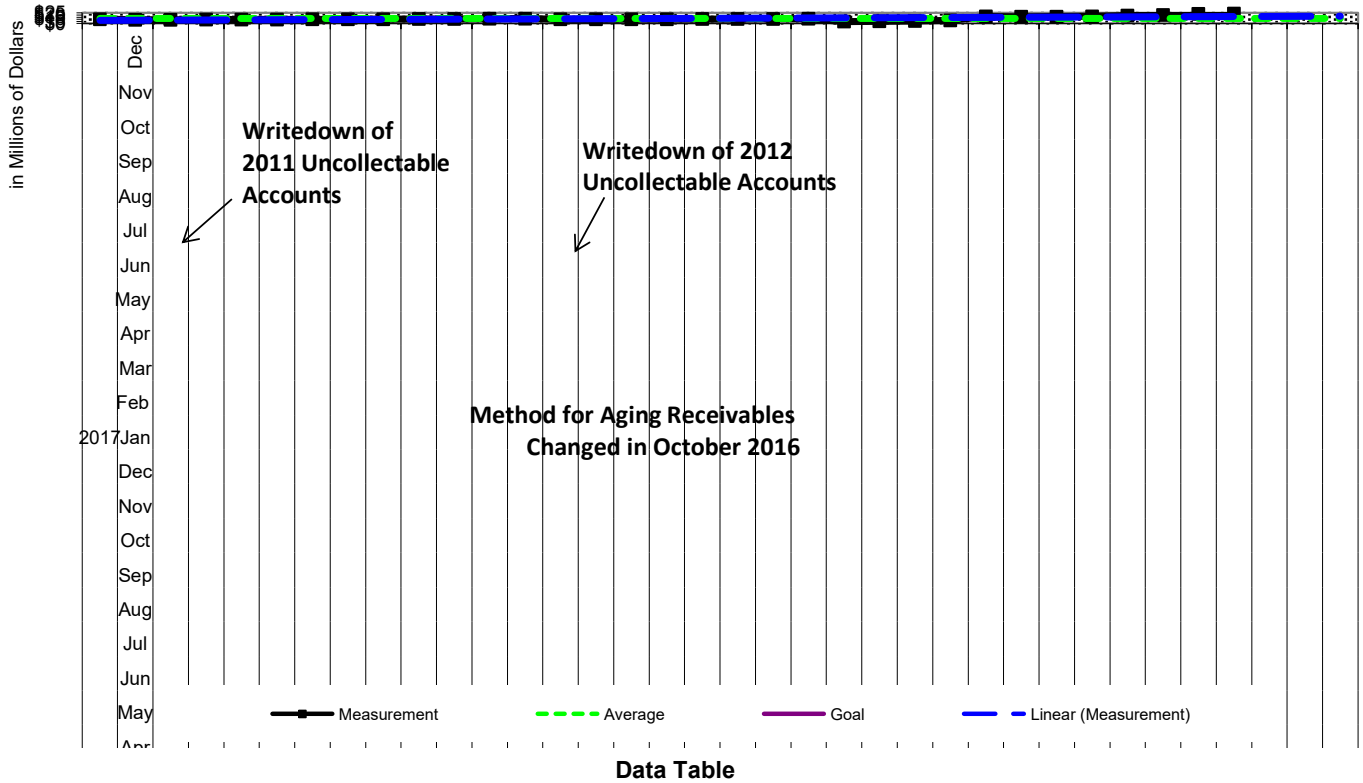
Trend: Method for Aging Receivables Changed in October 2016

Analysis

Water and sewer accounts receivable that are 120 days and older are handled by a collection agency. When those accounts remain uncollected after three years, the balances are written off as part of an annual process.

Plans for Improvement

It appears that the higher post-Katrina accounts receivable balances have been resolved through standard collection practices and that annual collection rates now exceed 98% of annual billings. Staff intends to use standard process improvement methods to continue collection practices pending implementation of new billing and collection system.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	$ 10.32	$ 8.78	$ 9.01	$ 9.19	$ 9.47	$ 9.62	$ 9.80	$ 10.02	$ 10.26	$ 10.51	$ 10.87	$ 11.25
2016	$ 11.71	$ 9.92	$ 10.09	$ 10.27	$ 10.34	$ 10.56	$ 10.74	$ 10.99	$ 11.35	$ 4.81	$ 5.57	$ 6.33
2017	$ 7.35	$ 16.93	$ 15.78	$ 16.40	$ 16.96	$ 18.60	$ 20.19	$ 22.80	$ 23.70			

Sewerage and Water Board of New Orleans
Total Service Requests for Sewer System Leaks

Constituency: Customer Ratepayers

Objective: Provide Timely Information and Respond Promptly to Requests

Goal: Reduce Number of Service Requests

Currently Meeting Goal: Yes

Process Operating Within Control Limits: Yes

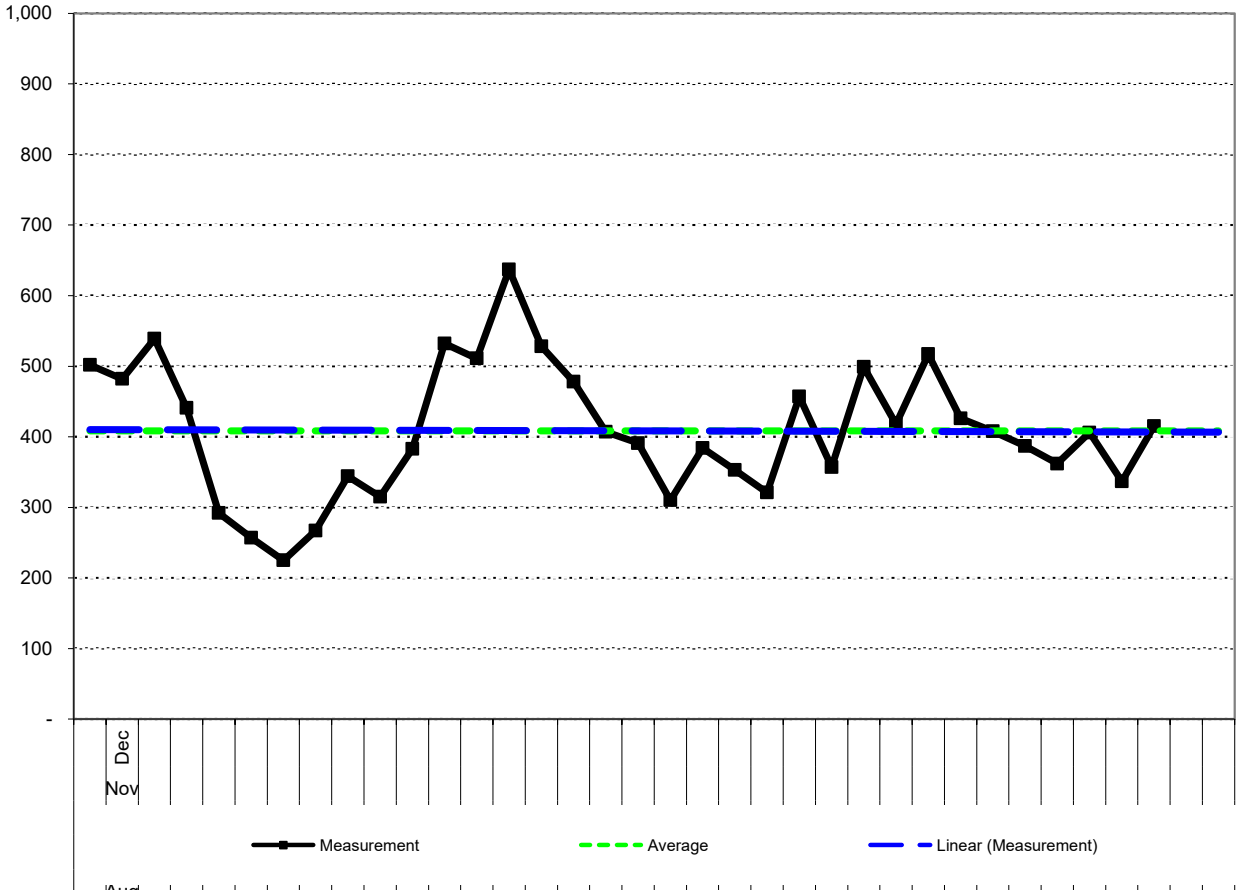
Trend: Favorable

Analysis

Customers contact the Sewerage and Water Board to request repairs to leaking sewer collection mains and service lines.

Plans for Improvement

Staff performs repairs as part of routine maintenance of the sewage collection system.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	502	482	539	441	292	257	225	267	344	315	383	532
2016	511	637	528	478	407	391	310	384	353	321	457	357
2017	499	418	517	426	408	387	362	406	337	415		

Sewerage and Water Board of New Orleans
Total Service Requests for Water System Leaks

Constituency: Customer Ratepayers

Objective: Provide Timely Information and Respond Promptly to Requests

Goal: Reduce Number of Service Requests

Currently Meeting Goal: No

Process Operating Within Control Limits: No

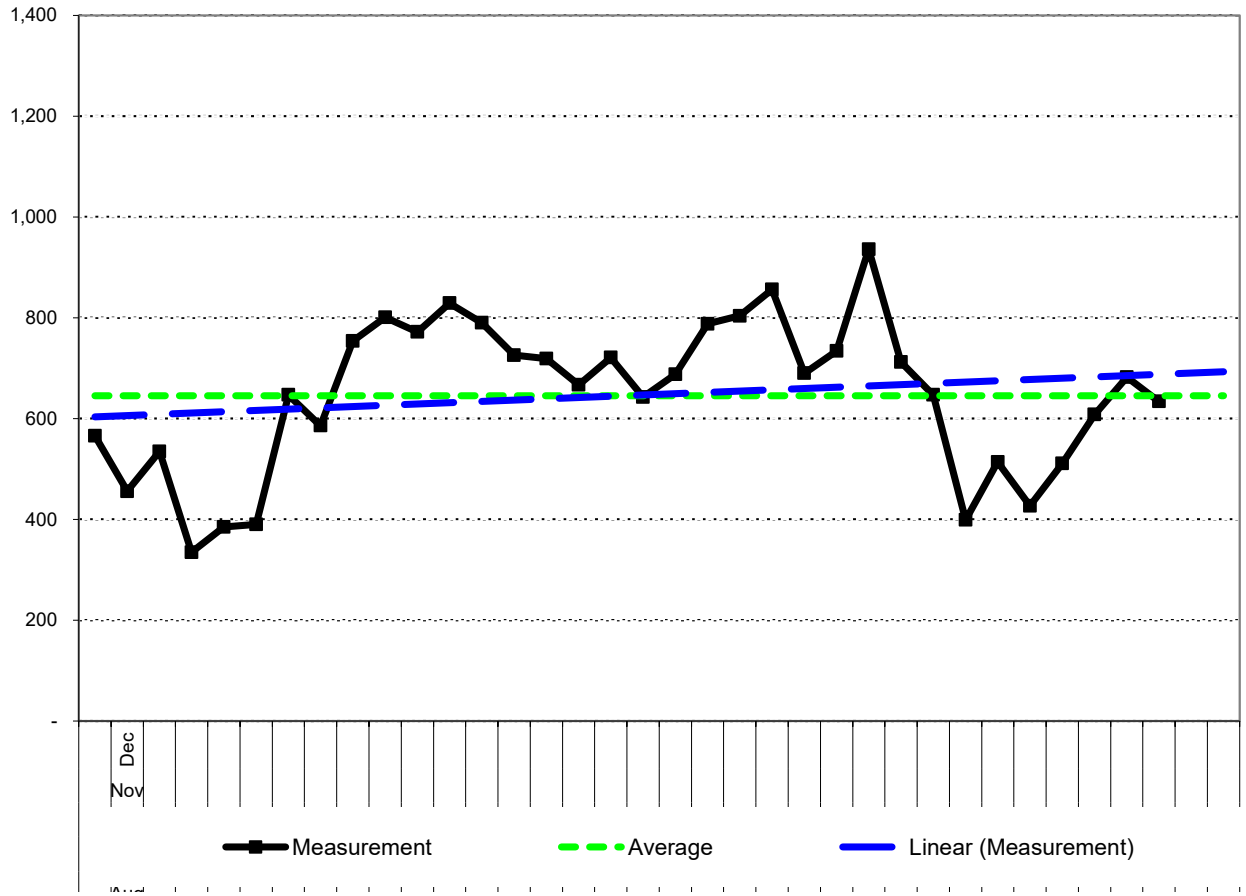
Trend: Unfavorable

Analysis

Customers contact the Sewerage and Water Board to request repairs to leaking mains, services and fire hydrants.

Plans for Improvement

Water mains with high frequency of failure are replaced as part of FEMA settlement.



Data Table

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	566	456	535	335	385	390	647	586	754	801	772	829
2016	790	726	719	667	721	643	688	788	804	856	690	734
2017	936	712	647	399	514	427	511	608	682	634		

The Big Picture

- **More than $2.4B worth of DPW / SWB is been designed and executed with DWP/SWBNO Joint Infrastructure Program**
  - Most comprehensive infrastructure program our region has seen in a generation.
  - Working together as one team to design and deliver projects
  - More than **200** individual projects - every neighborhood will feel a positive impact.
  - **Multiple Funding Sources:** FEMA-funded road / waterline work, FEMA-funded Hazard Mitigation Grant Program (HMGP) projects, HUD-funded National Disaster Resiliency Competition (NDRC) grant projects, SWB-funded Sewer System Evaluation and Rehabilitation Program (SSERP) (sewer consent decree) work and City-funded bond project work.
  - Aggressive project schedules coordinated to minimize construction-related impacts.
  - Work will create **thousands** of construction jobs across the city and maximize economic opportunity for the City's small and disadvantaged businesses.

The Big Picture

- **Will address long overdue repairs and make infrastructure improvements to roads, drainage, water, and sewer systems concurrently to maximize FEMA settlement.**
  - We have taken a comprehensive and programmatic approach to the work. We are coordinating daily with our team to design and implement this work.
  - Will leverage and link multiple funding sources with the results from the ***Citywide Pavement Assessment*** to improve drainage system capacity and resilience using green infrastructure.
  - Will meet all SWBNO sewer system consent decree milestones.

Types of Work

- Each project will encompass multiple, different street blocks and may include one or more different categories of work
- Planned work on individual street blocks will fall into one of six broad categories:
  - Non-Paving Incidentals
  - Incidental Road Repairs
  - Patch, Mill, and Overlay
  - Patch Concrete
  - Full Depth Reconstruction

Sewerage and Water Board of New Orleans
Report on Efficiency and Effectiveness of Information Systems
March 2018

Summary. Sewerage and Water Board utilizes automated information systems to support operations and maintenance activities of the water, sewer, and drainage systems:

- Tracking Maintenance Work Orders for the Water Distribution and Sewer Collection Systems
- Monitoring Systems Operations
- Project Management
- Creating and Updating Maps of Facilities
- Reading Meters
- Billing and Collecting Customer Accounts
- Tracking Information on Employees
- Paying Employees
- Paying Suppliers
- Preparing Financial Reports
- Supporting Facilities Security
- Supporting Office Communications
- Providing Access to Internet

Many of the major information systems are well beyond their designed lifespan and are in need of replacement. These systems remain effective due to the commitment by staff to support and maintain them during the extended period when funding for normal life cycle replacements was not available. The two primary deficiencies with existing systems are (1) the difficulty to maintain support on aged information technology architectures and software languages and (2) the difficulty in creating capabilities to meet evolving customer expectations.

Over the next five years, the Board will focus its information systems software replacements, upgrades, and enhancements in several directions:

- Replace all remaining mainframe systems
  - Dynamics GP HR/Payroll should go live in 2017
  - Dynamics GP Financial module implementation should begin 2018
- Enhance and improve GIS capabilities at the Board
- Replace current work order system (RJN Cassworks) with a GIS-based system
- Expand and enhance SCADA capabilities and reporting throughout the Board
- Enhance the Cogsdale CSM billing system with the implementation of Verint Customer Relationship / Scripting Software
- Implement Automated Meter Reading
- Replace telephone system with Voice over IP Telephony

Additionally, the Board is working on enhancing redundancy, resiliency, and security. A second fiber network for security camera systems is being built. Network security was recently

enhanced with the addition of a new firewall. The network was recently redesigned and upgraded. Monthly network scans are conducted and deficiencies are corrected quickly. Software security patches are quickly deployed.

The Board is planning a Resiliency Complex at its Carrollton Water Plant which will house key areas necessary for continued functioning in an emergency. A new Information Systems facility will be included in the complex. SWB Information Systems has been working closely with Board engineers and consultants in the design of that facility.

New information systems will allow for users to have significantly more direct access to information without the need to request special reports from Information Systems. The new payroll system will allow employees direct access to their own data on pay, leave balances, etc. as well as allow them to do electronic timekeeping. Also, in conjunction with the Dynamics GP HR project, the Board is implementing an online goal based evaluation system.

Current Software in Use at the Board.

- Tracking Maintenance Work Orders for the Water Distribution and Sewer Collection Systems. Sewerage and Water Board utilizes asset management and work order software from RJN:

  RJN Cassworks, Version 7
  Networks
  Plant

- Monitoring System Operations. Sewerage and Water Board utilizes Supervisory Control and Data Acquisition Software from:

  GE PROFICY HMI / SCADA-iFIX, Version 5.5
  GE PROFICY Historian Enterprise Server, Version 4.5
  OSIsoft Pi Historian
  Win911

- Project Management. Sewerage and Water Board utilizes project management software from both Oracle and Microsoft:

  Oracle Primavera P6 Enterprise Portfolio Management
  MS Project 2016

- Creating and Updating Maps of Facilities. Sewerage and Water Board utilizes GIS software from ESRI and drafting software from AutoCAD

  ESRI ARC GIS Server and Desktop, Version 10.2
  ESRI ARC GIS GeoEvent Server
  ESRI ARC GIS Online
  AutoCAD 2016

- Reading Meters. Sewerage and Water Board utilizes meter reading software from Itron to support the manual reading of water meters:

  Itron MVRS, Version 8.2.5

  Sewerage and Water Board has piloted software from Itron, Sensus, and Mueller as part of a larger procurement planning process. Implementation of automated meter reading capabilities will follow upon the successful implementation of the new billing system.

  In preparation for that project, Sewerage and Water Board contracted to have an assessment of readiness to implement automated metering, guide the procurement and oversee the implementation of the automated metering system, and perform additional analysis as needed. The initial assessment has been completed.

- Billing and Collecting Customer Accounts. Sewerage and Water Board utilizes software resources from Cogsdale:

  Cogsdale Customer Service Management (CSM) v12.28
  Cogsdale Permitting
  Cogsdale Mobile Work Management
  Vocantas IVR
  Matrix IT ACD
  Cogsdale Geolocation Management
  Satori CASS Certification

- Tracking Information on Employee and Paying Employees. Sewerage and Water Board utilizes human resources software from CGI/AMS:

  Advantage Human Resources GHRS System, Version 2.3.2
  Personnel Management
  Payroll Management
  Position Control
  Employee Benefits
  Employee Relations

  Sewerage and Water Board is implementing the Cogsdale Human Resources and Payroll System with go-live scheduled in 2018.

- Paying Suppliers and Preparing Financial Reports. Sewerage and Water Board utilizes accounting and financial software from CGI/AMS:

  Advantage Financial AFIN System, Version 2.2

General Ledger
Accounts Payable
Accounts Receivable
Workers' Comp
Bank Recon
Budget
Purchasing
Inventory Control
Fixed Assets

- Supporting Facilities Security. Sewerage and Water Board utilizes security camera and badge access software from LENEL:

  LENEL On Guard, Version 6

- Supporting Office Communications. Sewerage and Water Board utilizes Microsoft Office 2010 suite of software to support office automation:

  Microsoft Access
  Microsoft Excel
  Microsoft One Note
  Microsoft Outlook
  Microsoft Power Point
  Microsoft Project
  Microsoft Publisher
  Microsoft Visio
  Microsoft Word

  Sewerage and Water Board utilizes Microsoft and Symantec software to support email communications:

  Microsoft Exchange 2010, 2013 Server Software
  Symantec Email Vault Server, Version 12
  Symantec Messaging Gateway, Version 10.6
  Symantec Mail Security for Microsoft Exchange
  Symantec Anti-Virus, Versions 11, 12
  Symantec Enterprise Vault, Version 12.6
  Symantec Discovery, Version 12

- Providing Access to Internet. Sewerage and Water Board utilizes these software products to provide employee access to the Internet:

  Web Browsing Software: Microsoft Internet Explorer, Version 11
  Microsoft Edge 38
  Web Filtering Software: Websense Filtering Software, Version 7
  Streaming Software: Microsoft Media Services 2008, Version 2
  Firewall Hardware/Software: Palo Alto
  Terminal Emulation Software: Hummingbird HostExplorer Win32 v8;
  Open Text HostExplorer x64, v15

- Fleet Management. Sewerage and Water Board utilizes software from CYNDRUS and Motion Link for Fleet Management and Vehicle Tracking:

  Fleet Management Software, CYNDRUS, Version 3.5
  Fleet Tracking Software: Motion Link Vehicle Tracking and Monitoring

- Backflow Prevention. Sewerage and Water Board utilizes backflow prevention program software from BPMS for monitoring potential points of backflow:

  BPM, Version 6.11a

DRAFT

REPORT ON OPERATIONS FOR 2016

BLACK & VEATCH PROJECT NO. 195184

PREPARED FOR

Sewerage and Water Board of New Orleans

30 OCTOBER 2017

JULIEN ENGINEERING & CONSULTING

Bruno & Tervalon LLP Certified Public Accountants

BLACK & VEATCH Building a world of difference.®

MISSION STATEMENT

Our mission is to provide safe drinking water to everyone in New Orleans;
To remove waste water for safe return to the environment;
To drain away storm water;
To provide water for fire protection;
To provide information about products and services;
And to do all of this continuously at a reasonable cost to the community

VISION STATEMENT

Our vision is to have the trust and confidence of our customers
for reliable and sustainable water services

OUR VALUES

We will focus on our customers and stakeholders
We will treat each customer and employee with dignity and respect
We will value each employee, their work, and their commitment
We will be truthful, trustworthy and transparent
We will be knowledgeable and diligent in the performance of our duties
We will use financial resources prudently
We will be accountable for our performance
We will continuously improve our performance
We will ensure that the systems that provide our services remain viable for future generations
We will remain on the job and will be prepared for storms and other risks

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Introduction

PURPOSE AND SCOPE

This report covers operations of the Sewerage and Water Board of New Orleans for the year ended December 31, 2016. This report presents findings of studies made in compliance with covenants of the 2014 General Water Revenue Bond Resolution and the 2014 General Sewerage Service Revenue Bond Resolution. This report also includes recommendations designed to assist the Sewerage and Water Board of New Orleans and its staff in planning future operational policies. Subjects covered include the following:

1. Adherence to covenants of the General Water Revenue Bond Resolution and the General Sewerage Service Revenue Bond Resolution.
2. Ability to finance projected revenue requirements including proposed capital improvements.
3. Operations of the water, sewerage, and drainage systems.

DEFINITIONS

In this report, "Sewerage and Water Board of New Orleans," "Sewerage and Water Board," and "Board" are used synonymously. "General Resolution" refers to either the 2014 General Water Revenue Bond Resolution or 2014 General Sewerage Service Revenue Bond Resolution.

"Water Department" is the Sewerage and Water Board organization providing domestic water service to residents of the City of New Orleans. "Sewerage Department" is the organization providing wastewater service, and "Drainage Department" is the organization providing stormwater conveyance and pumping. The Board organization includes some groups who participate in two or more operational activities.

HISTORY

The Sewerage and Water Board of New Orleans was created by Act No. 6 of the Louisiana Legislature in 1899 as a special board independent of City government to develop, operate, and maintain the water and sewerage systems in the City of New Orleans. In 1903, the Louisiana Legislature gave control of the City's drainage system to the Board. Since that time, growth of the service area and increased service requirements have expanded the magnitude and complexity of operations.

Available sources of funds prior to 1958 for financing utility operations and improvements included ad valorem taxes, contributions-in-aid-of-construction, general obligation bonds of the City of New Orleans, and water revenues.

In 1974, the American Institute of Certified Public Accountants expanded their reporting guidelines for government operated utilities to include depreciation accounting. As a result, the Board initiated a preliminary system of accounting recognizing estimated historical investment as a basis for annual depreciation accruals. Implementation of the detailed plant accounting and record keeping required was started in 1979.

The Board's computer based budget code system provides a method of identification of operation and maintenance expenses for the Water, Sewerage, and Drainage Departments. Allocation of

expenses is based upon actual or direct expenses of each Department together with an apportionment of joint expenses. The procedures permit utility plant accounting with annual costs charged to the appropriate property account instead of being charged to current Department income. In accounting for debt service, interest is charged to current year's income and principal and debt service reserve payments are charged to the respective account balances. Historical operating costs, discussed later in this report, reflect the functional classifications.

Water Department

Act No. 541 increased the Board's ability to finance needed water system improvements by authorizing the Board to issue water revenue bonds. Subsequently, water revenue bonds in the amounts of $6,200,000 in 1960, $1,500,000 in 1961, $2,500,000 in 1964, $4,000,000 in 1971, $6,000,000 in 1978, $17,000,000 in 1980, $3,000,000 in 1981, and $5,000,000 in 1982 were issued. All water system revenue bonds outstanding in 1986 were defeased by the $31,350,000 Series 1986 Water Revenue Refunding bond issue. Additional revenue bonds in the amount of $16,000,000 were issued in 1998 and $34,000,000 were issued in 2002. In 2014, the Board issued Water Revenue and Refunding Bonds in the amount of $103,525,000. A portion of the proceeds were used to defease Series 1998 in the amount of $5,570,000 and Series 2002 in the amount of $22,085,000. In 2015, the Board issued Water Revenue Bonds in the amount of $100,000,000. Principal payments will begin in 2018. As of December 31, 2016, total outstanding debt service on all outstanding revenue bonds totaled $203, 200,000.

Act No. 566 reauthorized the Board to fix and administer a schedule of water rates to meet the operational and capital costs of the public water system, to issue water revenue bonds, and to discontinue the free water allowance for sewerage purposes effective November 9, 1966.

Sewerage Department

Act No. 567 gave the Board authority to set and collect sewerage service charges to be used for operational and capital costs of the Sewerage Department, and to issue sewerage service revenue bonds. This Act permitted the Board, for the first time in its history, to charge users of the sewerage system directly for related costs. Under the authority of Act No. 567, sewerage service charges were implemented May 1, 1967 and subsequently, sewerage service revenue bonds totaling $33,000,000 were sold in 1968, 1976, 1982 (2 issues), and 1983. All sewerage system revenue bonds outstanding in 1986 were defeased by the $21,280,000 Series 1986 Sewerage Service Revenue bonds. These bonds were fully retired in 1994. Sewerage system revenue bonds in the amount of $30,000,000 were issued in 1997; $25,000,000 in 1998; $47,100,000 in 2000 (two issues); $32,720,000 in 2001; $57,000,000 in 2002; and $5,500,000 in 2003. $33,000,000 in revenue bonds, $25,200,000 in Bond Anticipation Notes (BANs), and $111,800,000 in Refunding BANs were issued in 2004. The 2004 BANs were defeased by the $137,000,000 Refunding BANs Series 2005A. A portion of the 2005 BANs was refinanced with the Refunding BANs Series 2006. The remaining balance on the 2005 BANs were paid from funds on hand. The Refunding BANs Series 2006 were due July 15, 2009 and were paid in full by the issuance of Refunding Bonds Series 2009 in the amount of $23,375,000. In 2014, the Board issued Sewerage Service Revenue and Refunding Bonds in the amount of $158,990,000. A portion of the proceeds were used to defease all outstanding bonds with the exception of the Series 2011 bonds.

In November 2011, the Board and Louisiana Department of Environmental Quality (LADEQ) entered into a loan agreement whereby $9,000,000 of proceeds from the Revolving Loan Fund were

borrowed through the issuance of Sewerage Service Subordinate Revenue Bonds, Series 2011. Debt service payments assume a 20-year term with a 0.45 percent interest rate plus an administrative fee of 0.5 percent. The Board began drawing down the funds during the first quarter of 2012 and as of December 31, 2014, had received a total of $9,000,000 in disbursements. The Board began making principal payments in November of 2013. With the issuance of the Series 2014 bonds, the Series 2011 bonds became parity debt and entitled to the provisions of the General Sewerage Service Revenue Bond Resolution. In 2015, the Board issued Sewerage Service Revenue Bonds in the amount of $100,000,000. Principal payments will begin in 2021.Total outstanding principal on all revenue bonds totaled $242,668,000 as of December 31, 2016.

Drainage Department

In 1966 three constitutional amendments, Acts No. 565, 566, and 567 were enacted by the Louisiana Legislature and subsequently approved by the State's voters. Act No. 565 authorized the City of New Orleans to levy a three-mill ad valorem tax, effective January 1, 1967, to be used solely for operations and capital costs of the drainage system. Provision for issuance of bonds repayable solely from the three-mill tax was also included in the Act. In 1967, the Board issued $15,000,000 of three-mill tax bonds. These bonds were fully retired in 1992.

Under the Louisiana State Constitution, all assessments beginning in 1978 were equalized, with residential property assessed at 10 percent of its market value and commercial and personal property assessed at 15 percent of market value. The constitution also provides that no tax revenues shall be lost by reassessments; thus, it has been necessary to revise the millage rates in effect at various times. If reassessment results in a lower tax base, the millage rate may be adjusted upward. If a larger tax base results, the millage rates must be rolled back. However, by state law, the City Council, upon request and after a public hearing, may increase the millage rates to the prior year's level. The three-mill tax rate, 6.01 mills since 1988, was increased to 6.40 mills in 1992 due to reassessment, and remained at that level through 2007. In 2007, it was reduced to 4.544 and in 2010 it was increased to the current rate of 4.66 mills.

Passage of a referendum in April 1977, authorized the collection of an additional six-mill, ad valorem tax for drainage purposes, effective January 1, 1978. The six-mill ad valorem tax was increased to 6.09 mills in 1988 and to 6.48 mills in 1992 due to reassessment and remained at that level through 2007. In 2007, it was reduced to 4.60 and in 2010 it was increased to the current rate of 4.71 mills. In 1978, the State Legislature authorized a debt limit of $18,000,000 as sought by the Board of Liquidation, City Debt. That debt limit was eliminated by Legislative action in 2003. The Board issued $18,000,000 in Series A, six-mill tax bond in November 1978. During 1994 the Board issued Drainage System Refunding Bonds, Series 1994, for the purpose of refunding the six-mill 1978 bonds. The 1994 bonds were considered to be an obligation of the six-mill ad valorem tax revenue and have been repaid.

In 1980, a constitutional amendment, Act No. 844, authorized an increase in the exemption of each homestead from ad valorem taxes from $5,000 to $7,500, and provided for periodic reassessment.

In 1981, a nine-mill ad valorem tax was approved and became effective January 1, 1982. It was reauthorized in December 2016. The purpose of the nine-mill tax levy is to provide funds for the operation, maintenance, and construction of the drainage system. State law set the authorized debt

limit for nine-mill bonds at $68,000,000. That debt limit was eliminated by Legislative action in 2003. The Board sold nine-mill bond issues of $22,000,000 in 1982 and $30,000,000 in 1983. In 1986, $12,525,000 Drainage System Bonds Series 1986A and $15,755,000 Drainage System Bonds Series 1986B were authorized and sold for the purpose of refunding a portion the 1982 nine-mill bonds and a portion of the 1983 nine-mill bonds, respectively. In 1992 the Drainage System Bonds, Series 1982, was fully refunded, and beginning in 1993, debt service payments on the Drainage System Bonds, Series 1986A was paid from nine-mill tax revenue. In 1993, proceeds from the Drainage System Bonds, Series 1986B fully refunded the Drainage System Bonds, issue of 1983, and the debt service on these bonds became the obligation of nine-mill tax revenue. All Series 1986A and Series 1986B bonds have been retired. In 1998 nine-mill bonds in the amount of $10,000,000 were issued and additional nine-mill bonds in the amount of $20,000,000 were issued in 2002. In 2014, the Board issued Drainage System Refunding Bonds in the amount of $14,900,000 for the purpose of refunding Series 1998 and Series 2002. The total nine-mill Drainage System Bonds outstanding as of December 31, 2016 was $11,100,000.

In 1988, reassessment caused the nine-mill ad valorem tax to be increased to 9.13 mills, and it was increased due to reassessment again in 1992 to 9.71 mills, and remained at this level through 2007. In 2007, it was reduced to 6.89 and in 2010 it was increased to the current rate of 7.06 mills.

Collection of the three-mill ad valorem tax levy is authorized through 2046; six-mill tax through 2026; and nine-mill tax through 2031.

General

During January 2006, the Board entered into a long-term agreement with the Federal Emergency Management Agency (FEMA) under the Community Disaster Loan Act of 2005. The Board has drawn down $61,956,747 of the funds available. In December 2010, the Board was granted a partial forgiveness in the amount of $36,790,000 of principal and $4,648,410 of accrued interest, leaving a balance of $25,166,747 in principal. In September of 2013, the Board was granted full forgiveness of the remaining balance of $25,166,747.

In July of 2006 the Board entered into a Cooperative Endeavor Agreement with the State of Louisiana to secure proceeds from the State's Gulf Opportunity Tax Credit Bond Loan Program to assist in payment of debt service requirements from 2006 through 2008. The Board has borrowed $77,465,247, which was the total amount available to the Board. Of that amount, $31,500,000 was used to make a partial payment on the Sewerage Service Refunding BANs Series 2005A that matured on July 26, 2006. The remainder was used to make debt service payments on the Drainage System special tax bonds, the Sewerage Service revenue bonds, and the Water revenue bonds that were due on December 1, 2006; June 1, 2007; December 1, 2007; and June 1, 2008. Principal payments on the bonds began in July 2012 and continue through July 2026. As of December 31, 2016, the amount outstanding was $51,844,281.

The Board is currently receiving funds from the U.S. Army Corps of Engineers (COE) sponsored and congressionally authorized Southeast Louisiana Urban Flood Control (SELA) Project. This funding will allow additional construction projects which were identified in the 1970s, but which have not been completed because of funding limitations. The identified projects are to be funded either 100

percent from federal funds or 65 percent from federal funds and 35 percent from local funds. The payback period for the local share is 30 years and is anticipated to begin in 2020.

The Board provides water and sewer for public services to the City of New Orleans and its public institutions as mandated by state law in accordance with R.S. 33:4096 and R.S. 33:4121, respectively. During 2016, the Board provided 1,062,993,239 gallons of water for public services to agencies of the City of New Orleans. The value of this water, at current rates, is $46,141,187.68. The value of the sewerage charges is $110,153,094.86.

The three revenue-generating public agencies - the New Orleans Museum of Art, City Park, and Audubon Park – continued to receive water for public services under "caps", or maximum annual limits, established by the Legislature in 1982. The Museum of Art used 119,800 gallons or 2,434,000 below its annual "cap" of 2,553,800 gallons. City Park used 25,021,600 gallons or 210,301,800 below its annual "cap" of 235,323,400 gallons. Audubon Park used 97,490,200 gallons or 142,509,800 gallons below its annual "cap" of 240,000,000 gallons.

The Sewerage and Water Board and the Orleans Parish School Board (OPSB) reached an agreement effective July 1, 1992, whereby the schools would be charged for any water exceeding an allowance of six gallons per day, for 365 days per year, for each student enrolled and any other person regularly assigned to that campus or facility. The allowance was lowered to four gallons per day effective July 1, 1993.

SOURCES OF FINANCIAL DATA

Financial information included in this report is obtained from audited financial reports provided by the Board.

SUMMARY OF FINDINGS

This section contains a summary of the financial operations of the Water, Sewerage, and Drainage Departments for the year 2016. Projections of future operations are also presented as a basis for determining the adequacy of present revenue sources to finance projected operating expenses and proposed capital program costs of the respective departments.

The statistical data maintained by the Board includes the compilation of detailed information on water sales and revenues. Information provided for 2016 includes a summary of the number of bills issued, billed volume, and revenues by customer class for both the Water and Sewerage Departments.

Operation and maintenance expenses are summarized by supplemental accounts that are used for internal purposes to identify the cost in each functional category that is incurred for personal services, services and utilities, material and supplies, replacement and maintenance, and other special charges.

Water Department

Water Revenue Bond Resolution Requirements

Sewerage and Water Board financial operations for 2016 have complied with the requirements set forth in the 2014 General Water Revenue Bond Resolution.

Summary of 2016 Operations

Based upon a tabulation of water bills rendered during the year, the Water Department provided water service to an average of 134,872 regular billed customers and 1,107governmental accounts, the latter of which are served without charge. According to data provided by the Board, of the 51,561.3 million gallons of water pumped by the Department during the year, 13,106.7 million gallons were sold, 1,042.7 million gallons were metered to customers without charge, treatment plant process water totaled 532.2 million gallons, and unmetered uses accounted for the remaining 36,681.2 million gallons. Unmetered water uses include fire protection; flushing streets, sewers, and drains; chlorinating and flushing new water mains; construction of streets; Sewerage and Water Board plant uses; and unaccounted for system losses.

The total revenue from water sales, delinquent fees, interest income and other income increased from $82,956,619 in 2015 to $88,358,817 in 2016. Operation and maintenance expenses (excluding claims paid) increased from $78,264,668 in 2015 to $76,886,448 in 2016. After adding claims of $1,847,021 and debt service payments of $10,222,220, a negative balance of $596,872 was available for capital related expenditures in 2016, unadjusted for depreciation.

Ability to Finance Future Operations and Proposed Improvements

A summary of projected financial operations of the Water Department for the period 2017 through 2021 is shown in Table 12 of the report. Revenues shown on Line 1 of Table 12 are based on rates that became effective January 1, 2017. Revenue from future annual water system revenue increases of 10 percent effective January 1, 2017 through January 1, 2020, followed by 6 percent effective January 1, 2021 are shown on Line 2 of Table 12.

Future long term debt financing of $178,000,000 in 2018 and $103,000,000 in 2021 is indicated to fund the proposed capital improvement program.

As demonstrated in Tables 11 and 12, it is anticipated that current revenue sources will be adequate to readily finance both projected capital program requirements and estimated future operation expenses of the Water Department during the 2017-2021 study period examined herein.

Sewerage Department

Sewerage Service Revenue Bond Resolution Requirements

Sewerage and Water Board financial operations for 2016 have complied with the requirements set forth in the 2014 General Sewerage Service Revenue Bond Resolution.

Summary of 2016 Operations

The total revenue from sewer charges, delinquent fees, interest income and other income increased from $98,165,766 in 2015 to $108,233,756 in 2016. Operation and maintenance expenses (excluding claims paid) increased from $$58,028,723 in 2015 to $58,240,656 in 2016. After adding claims of $2,380,775 and debt service payments of $24,616,125, a balance of $22,996,200 was available for capital related expenditures in 2016, unadjusted for depreciation.

Ability to Finance Future Operations and Proposed Improvements

A summary of projected financial operations of the Sewerage Department for the period 2017 through 2021 is shown in Table 24 of the report. Revenues shown on Line 1 of Table 24 are based on

rates that became effective January 1, 2016. Revenue from future annual wastewater system revenue increases of 10 percent effective January 1, 2017 through January 1, 2020, followed by 1 percent effective January 1, 2021 are shown on Line 2 of Table 24.

Future long term debt financing of $158,000,000 in 2018 and $124,000,000 in 2020 is indicated to fund the proposed capital improvement program.

It is anticipated that current revenue sources will be adequate to readily finance both projected capital program requirements and estimated future operation expenses of the Sewerage Department during the 2017-2021 study period examined herein

Drainage Department

Summary of 2016 Operations

Total revenues received from all sources including interest income totaled $57,349,315 in 2016, an increase of approximately 5.5 percent from $54,367,386 reported for the same sources in 2015. Total operation and maintenance expenses decreased about 11.4 percent, from $37,814,502 in 2015 to $33,523,624 in 2016. After adding claims of $2,223,009 and debt service payments of $2,017,050, a balance of $19,585,632 was available for capital related expenditures in 2016.

Ability to Finance Future Operations and Proposed Improvements

An analysis of financial operations projected for the Drainage Department for the period 2017 through 2021 is summarized in Table 35 of the report. Revenue from the three-mill, six-mill, and nine-mill ad valorem taxes may be used for operating expenses, debt service, and capital expenditures.

The analysis indicates that the current revenue sources are not adequate to meet operation and maintenance expenses and total debt service on existing bond issues beginning in 2021. In addition, the Drainage Department will not have the debt capacity to fund all of the capital requirements through 2021. Due to constraints on revenue, it is anticipated that capital projects during the 5-year period will exceed the amount of funding available from the Drainage Department. It is recommended that the Board defer capital projects until an additional source of operating revenue has been identified and the SWBNO has the capacity to debt finance more projects. This deferment is shown on Line 9 of Table 34.

Other Findings

The Board operates a power plant at the Carrollton Water Purification Plant which provides power for the water purification process as well backup power in the event that commercial power fails or becomes unavailable. The Board's analysis of power purchased and produced is shown in the supplemental section of the 2016 Comprehensive Annual Financial Report. In 2016, approximately 69.7 million kilowatt hour (kWh) of power was purchased and 33.2 million kWh of power was generated.

On a unit cost basis, the average cost of purchased power has increased over the past five years from about 9.3¢ per kWh in 2012 to about 10.2¢ per kWh in 2016. During the same period, the Board's unit cost for generated power has increased from about 20.5¢ per kWh to about 27.4¢ per kWh. In 2016, the cost of Board generated power was 2.7 times higher than that of purchased power; however, this

higher cost is offset by the fact that the Board generated power is much more reliable that the purchased power from the local utility company.

In conducting our analyses and in forming an opinion of the projection of future operations summarized in this report, Black & Veatch has made certain assumptions with respect to conditions, events, and circumstances that may occur in the future. The methodology utilized by Black & Veatch in performing the analysis follows generally accepted practices for such projections. Such assumptions and methodologies are summarized in this report and are reasonable and appropriate for the purpose for which they are used. While Black & Veatch believes the assumptions are reasonable and the projection methodology valid, actual results may differ materially from those projected, as influenced by the conditions, events, and circumstances that actually occur.

2017 POWER AND PUMPING EMERGENCY EVENT

The City of New Orleans experienced heavy rains on August 5th that resulted in flooding events throughout the City. At the time of the rain event, several drainage pump stations were down for repairs or not operating due to limited staffing availability. In addition, repairs necessary at the Carrollton power plant resulted in power limitations to some of the operable drainage pumps. On August 9th, the existing Executive Director of the SWBNO declared a state of emergency and authorized the purchase of necessary materials and furnishing of the labor necessary to make all emergency repairs to the system. On August 10th, the Board of Directors unanimously adopted a motion to repair the power and pumping facilities, conduct an independent analysis of the power generation and drainage systems, and provide for interim management of the SWBNO. On August 22nd City officials named an interim emergency management team to focus on the SWBNO's pumping and power capabilities.

The Facilities Evaluation included in this report reflects the findings of onsite assessments of the SWBNO facilities conducted by Black & Veatch from May 16 to May 20 and does not reflect the condition and operation of the system in August. Black & Veatch made no additional inspections, evaluations, or assessments after May 20th.

In December 2016, the Board adopted the 2017 capital program, 2017-2026 capital program and 2017 operating budget. On September 20, 2017, the Board adopted amended capital and operating budgets reflecting the acceleration of seven large capital projects necessary to repair the system, lower than anticipated water and sewer revenue, higher than anticipated drainage system expenses, and changes to other operation and maintenance expenses following a mid-year review of activities. The financial evaluations of the Water, Sewerage and Drainage departments presented in this report reflect the amended budgets authorized in resolutions R-112-2017 and R-113-2017.

Facilities Evaluation - Operation, Maintenance, and Reconstruction

This evaluation summarizes the findings of the onsite assessments of the Sewerage and Water Board of New Orleans (SWBNO) facilities conducted by Black & Veatch from May 16 to May 20, 2017. Site visits were conducted at the water and wastewater treatment plants, Carrollton power plant facilities, and Central Yard facilities to evaluate the condition and operational capabilities of these facilities. In addition, the sewage and drainage pump stations were inspected to evaluate their condition. Interviews were conducted with SWBNO management and supervisors during the site visit to assess the current operations status of the various facilities.

INTRODUCTION

The operations department of the SWBNO is comprised of four units: (1) Water Purification, (2) Sewage Treatment, (3) Water Pumping and Power, and (4) Sewage and Drainage Pumping. The SWBNO operates the Carrollton and Algiers Water Purification plants (WPPs), which purify raw water from the Mississippi River and supply potable water to New Orleans residents. The Carrollton Plant currently purifies approximately 135 million gallons per day (mgd) of water for the East Bank of Orleans Parish. The Algiers plant, which serves the predominantly residential West Bank portion of the parish, purifies roughly 10 mgd of water. The treated water from the two plants is pumped through approximately 1,800 miles of mains to the service connections within the city, as well as to several customers in adjacent parishes.

The sewerage collection system includes several miles of lateral sewers, trunk sewers, and 83 electrically-operated pump stations. Raw sewage is conveyed through a force main system. Sewage Pumping Stations (SPSs) A and D on the East Bank and SPS C on the West Bank are attended stations. SPS A houses a supervisory control and data acquisition (SCADA) system, which monitors operation of all other sewage stations 24 hours a day.

The SWBNO operates two sewage treatment plants, one on the east bank and one on the west bank. The East Bank Sewage Treatment Plant has a treatment capacity of 122 mgd (dry weather) and treats sewage from the East Bank community. The West Bank Sewage Treatment Plant has a treatment capacity of 20 mgd (dry weather) and serves the West Bank community, as well as a few customers in Plaquemine Parish. Both plants were built or expanded in the 1970s and have been upgraded or expanded to increase reliability and capacity. The contract operator, Veolia Water, currently operates and maintains the plants for SWBNO.

In addition, the SWBNO is responsible for operating and maintaining the 24 major drainage pumping stations in New Orleans and 11 smaller (automatic) underpass stations. The majority of those stations are manned 24 hours per day, 7 days per week. Each station is equipped with multiple pumps, which are activated in response to increasing water levels. Personnel routinely monitor these pumps and the numerous miles of drainage canals to ensure proper drainage in the area.

The 25 cycle power plant operated by the SWBNO provides power to portions of the WPPs and approximately 60 percent of the drainage pumps. Two large vertical sewage pumping units at Station A are also run on 25 cycle power. The following sections summarize key issues within several departments of the SWBNO.

STAFFING

Adequate staffing continues to be an issue for most departments at the SWBNO. Additional maintenance is required for the SWBNO facilities as equipment ages and more equipment is added. Staffing levels have decreased as the system has aged and expanded within the SWBNO-owned facilities. Vacancies still exist in several departments, especially those departments requiring highly educated and skilled personnel. These shortages are reflected within the more technical disciplines such as mechanical maintenance, electrical maintenance, plant maintenance, welding and fabrication, and operations. Engineering is still understaffed, but it is improving because the slowdown of private industry in the local area.

The SWBNO suspended the domicile policy following Hurricane Katrina, which required employees to live in New Orleans. This suspension action allowed personnel hired by the SWBNO to live outside city limits, thus providing more housing options for employees. The City Council reinstated the residency requirements as of January 1, 2013, which has slowed the hiring of individuals with an interest in working for the SWBNO but live outside city limits. Departments within the SWBNO continue to actively recruit from local college campuses, career job fairs, and trade schools to fill vacancies.

In addition to those highly skilled positions, a significant portion of the SWBNO's leadership will retire within the next five years. Very few potential successors have been identified to assume the leadership positions of the personnel facing retirement.

Most departments have staffing issues related to being inadequately staffed to fulfill the current needs of the SWBNO. The table below summarizes the number of staff on the payroll for each department related to operations and maintenance, and the percentage of staff eligible for retirement within the next five years (as of May 2016). These conditions demonstrate the need for an effective succession plan for the department heads and supervisors.

Current Number of Board Employees and Employees Eligible for Retirement

DEPARTMENT	EMPLOYEES ON PAYROLL	ELIGIBLE FOR RETIREMENT	% ELIGIBLE FOR RETIREMENT
Operations - Water Purification Plants	50	16	32.0
Operations - Water Quality Laboratory at Carrollton Plant	9	3	33.3
Operations - Water Pumping and Power	75	18	24.0
Operations - Sewage and Drainage Pumping Stations	105	30	28.6
Facility Maintenance	61	17	27.9
Engineering	48	18	37.5
Networks	319	57	17.9
Support Services	102	29	28.4
Environmental Affairs	12	4	33.3
Total	**781**	**192**	**24.6**

WATER PURIFICATION PLANTS

The Black & Veatch representative accompanied the WPP superintendent on facility tours of the Carrollton and Algiers WPPs. The Carrollton and Algiers WPPs are currently operational and producing water that meets or exceeds federal drinking water standards. Treatment systems at both plants are functioning well and continue to produce potable water for the East Bank and West Bank.

The staffing levels at the Carrollton and Algiers WPPs have been able to consistently produce finished water that complies with federal and state regulations and meets the capacity of the service population. The SWBNO is facing the industry-wide problem of an aging workforce; therefore, there is an immediate need to hire and train personnel for the future sustainability of plant operations. The SWBNO has hired entry-level personnel and is in the process of hiring more to begin addressing those long-term needs. SWB has an internal training program that assists operations staff with passing their state certification exams. In addition, state certified operators are in short supply and are required onsite at all times because they are necessary to successfully operate the plants around the clock. The most senior operators will be retiring within the next few years and will need to be replaced in order to maintain compliance with the state requirements for operator certification in water treatment. At present, there are not enough certified water plant operators to cover all the shifts and the department is using overtime to ensure compliance is maintained.

Carrollton Water Purification Plant

The Carrollton WPP has a design capacity of 210 mgd. The water treatment processes at the plant consist of flocculation with a polymer and ferric sulfate followed by pH adjustment with lime. The flocculated particles are allowed to settle in sedimentation basins and traveling mechanical rakes remove the settled solids from the sedimentation basins for discharge to the Mississippi River.

Chlorine in the form of sodium hypochlorite is used to disinfect the clarified water. Anhydrous ammonia is then added to form chloramines for residual disinfection. Additional settling time and disinfection contact time occur in the secondary settling basins. The clarified water is also treated with sodium hexametaphosphate for calcium sequestration and hydrofluorosilicic acid for fluoride addition. The SWBNO is feeding all chemicals at appropriate dosages and maintaining adequate chemical storage at each site.

Filtration is the final step in the treatment process, which is where the water is filtered through rapid sand filters. Finished water is then pumped to the populace through the distribution network.

The Carrollton WPP is currently treating approximately 135 mgd of water for the East Bank of Orleans Parish, partly due to leaks in the water distribution system. Leaks in the distribution network are a source of persistent problems. These leaks are currently being addressed under the water main replacement program funded by the Federal Emergency Management Agency (FEMA). The water delivery pressure, at 70 psi, has been consistent throughout the last year.

L3 Sedimentation Basin Flocculator Rehab **Filter Media replacement at Filter 7**

Figure 1 – Carrollton Water Purification Plant

Improvements initiated and/or completed at the Carrollton WPP during 2015 include:

- The G4 Sedimentation Basin was placed back into service after the basin was cleaned and flocculator rehab was completed in 2015. After operating the basin, it was determined by operations staff that the basin had a leak, and was offline at time of visit.
- Claiborne Filter 1 Media Replacement and Rehab was completed and was recently returned to service. The filter is currently performing well.

The following maintenance and/or improvement projects for existing facilities at the SWBNO are planned or ongoing:

- L3 Sedimentation Basin is offline for flocculator rehab and maintenance of the basin's mechanical components.
- The bid for a contractor to do a chalk and water test for the G4 Basin will be advertised during the summer of 2016. This work is scheduled to be completed by the end of year.
- A tank mixing study was conducted on all tanks at the plant (including tanks at Algiers WPP) including hydraulic modeling. As a result, these storage tanks will be modified with manifold systems for better tank mixing.
- Four concrete 4 MG storage tanks are in the process of being repainted. The tanks were inspected and the tank structures were determined to be in good condition.

- A filter rehabilitation program is planned for the Sycamore and Claiborne filter galleries. Valves, actuators, corroded piping supports, and leaking pipes associated with the filters need to be repaired or replaced. Media replacement is ongoing for the Claiborne filter gallery.
- Media replacement for Claiborne filters is ongoing currently. Media was being taken out of Filter 7 at the time of the onsite visit. Filter 5 media is also being replaced. At the time of replacement, the filter structure is inspected (such as the underdrains) and additional repairs are made.
- The Sycamore filter wash water pump for the filters is planned for replacement. The packing seal was leaking during the site visit and the pump is nearing the end its service life. The project is currently in design.
- The recycle basin pumps are being replaced. Two of the four pumps are currently inoperable and the other two pumps are nearing the end of their service life. Construction is currently ongoing.
- Design for a new 30-inch sludge discharge line is underway. This new line will provide for much needed capacity and redundancy improvements for the Carrollton WPP. This improvement was in design at time of site visit and will be installed in 2017.
- An additional temporary ferric sulfate bulk storage facility (20,000 gallons of tanks and temporary containment) is in the process of being added due to limited local supply of the chemical.
- A new chemical storage and feed facility is currently under design. The facility will house most of the chemicals onsite.

Algiers Water Purification Plant

The Algiers WPP has a design capacity of 40 mgd. The treatment process at the plant is similar to that of the Carrollton facility and uses the same chemicals with a slightly modified application scheme in the upflow clarifiers. At present, the plant is treating approximately 10 mgd of water and is serving the predominantly residential West Bank portion of the parish.

The facility has partially commissioned a new ferric storage and feed system for flocculation at the WPP. This equipment, along with the existing temporary ferric storage and feed equipment, is supporting the needs of the plant with the goal of a complete transition to the new facility by the end of 2016.

Other improvements needed or ongoing at the plant include the following:

- A new bulk sodium hypochlorite tank was added, along with metering pumps to supply bleach for disinfection. Two existing bulk tanks were repurposed from the decommissioned sodium hypochlorite generation system.
- Instrumentation was added to the filters to display flow (MGD) and headloss at each filter. These instruments currently are not tied into SCADA. Future SCADA upgrades will integrate these readings for filter monitoring.
- EIMCO Clarifiers No. 3 and 4 are under contract to design the replacement of the launder troughs. The troughs and steel structures have significant corrosion. The mechanical components of the clarifiers are operating well and are maintained by the maintenance staff.
- EIMCO Clarifier 2 was painted in 2015.

- In addition to the rehab and painting of the EIMCO clarifiers, flash mixing will be added to assist with better TOC removal in the clarifiers. The existing clarifiers will be modified to include an additional mixer near the chemical injection point.
- Fluoride storage and feed system needs to be upgraded to meet state requirements. The fluoride system will consist of a bulk storage tank, a day tank, and metering pumps and will be located in an existing building.
- Lime is currently slaked at the WPP. SWB is looking into replacement of the lime equipment pending a decision of process change (different type of lime) or direct replacement of existing slaking equipment.
- The raw water pumping and piping systems need to be improved in order to provide redundancy to the intake system.

Corrosion on Clarifier Troughs **New Sodium Hypochlorite Storage Tank**

Figure 2 – Algiers Water Purification Plant

WATER QUALITY LABORATORY

The water quality laboratory located at the Carrollton WPP conducts daily analyses of river water quality and purified water for both WPPs. Water samples from the distribution network are also analyzed at the laboratory facility. The lab continues to meet the state and federal mandated analytical requirements of the water plants and it is certified by the Louisiana Department of Health and Hospitals for analysis of coliform bacteria.

The laboratory collects samples for protozoan analysis in addition to coliform analysis. Other regular analyses include hardness, turbidity, fluoride, ammonia, pH, alkalinity, total organic carbon (TOC), dissolved organic carbon (DOC), phosphorus, corrosion monitoring, and chlorine residual at different stages of treatment. The solids are analyzed for total suspended solids (TSS) and total dissolved solids concentrations. The laboratory also analyzes river water and finished water samples for volatile organic compounds.

The laboratory continues to maintain its involvement in the Early Warning Organics Contamination Detection System (EWOCDS) run by the State Department of Environmental Quality (LDEQ), despite that several of the LDEQ upstream stations have proved unreliable. The EWOCDS program has also been underfunded by the state of Louisiana, which has caused a reduction in sampling and analysis.

The remaining reliable monitoring stations are connected by telecommunications to notify LDEQ if any of the 60 Environmental Protection Agency (EPA) listed pollutants are detected in the river water samples. The LDEQ disseminates the information to the program participants, allowing an early warning of possible problems. The LDEQ maintains EWOCDS equipment at all participating locations while the program participants provide the manpower to collect and analyze the samples.

The laboratory is currently under-staffed with one supervisor, one microbiologist, two chemists, and three technicians. The lab lost two chemists and a lab technician over the past year, which has created vacancies that SWB is working to fill. Much of the lab instrumentation and equipment is reaching or has reached the end of its service life and is in need of replacement. Newer analytical instruments and equipment, such as a new gas chromatograph/mass spectrometer (GC/MS), autoclaves for the microbiology lab, and fume hoods in the chemistry lab are needed. The autoclaves are being acquired for lab use. The laboratory staff obtained certification to analyze TOC at the SWBNO facility; however, the certification recently lapsed due to lack of lab staff (mainly chemists) to maintain the QA/QC requirements for TOC analysis.

WATER PUMPING AND POWER

The primary function of the Water Pumping and Power unit of the Operations Department is to produce steam for the generation of 25 hertz (Hz) power in addition to pumping potable water to the City of New Orleans. The facilities at the Carrollton power plant include three pumping steam turbines and one gas turbine for a total theoretical capacity of 61 megawatts (MW of 25 cycle power). The steam required for the turbines is generated in the six boilers at a total capacity of 650,000 pounds of steam per hour. In addition to the 25 Hz turbine, newly installed Turbine No. 6 produces 15 MW of 60 Hz power, and was made operational in early 2016. The turbine only serves as back up, but is run every two weeks to ensure it is working properly.

The generating station at the Algiers facility is capable of producing 60 cycle power using a diesel generator. The power generation facility can generate enough power to support operations at the Algiers plant. This station is also capable of performing a frequency change from 25 Hz power supplied from the Carrollton power plant to 60 Hz power.

The current capacity of the Carrollton power plant is 40 MW, which is less than the 61 MW design capacity. Turbine No. 4 is currently being repaired and will undergo testing to ensure it is operating capacity. Turbine 3 is currently online and scheduled to be repaired in 2016-2017 once Turbine 4 is back online. Rehabilitation of Boilers No. 4, 5, and 6 was completed in 2015-2016. Boiler 3 is currently being rehabbed and will be complete in 2016. Boiler 1 will be rehabbed once Boiler 3 is completed. Additional boiler piping is scheduled for repair and replacement. This project will occur once all the boilers are rehabbed and operational.

A 200 psi high pressure natural gas line supplies fuel for the 15 MW 60 cycle, dual fuel generator turbine package (Turbine No. 6) and the existing Turbine No. 5. The 15 MW, 60 Hz generator facility supplements the commercial power available from Entergy to provide power redundancy and

continued service in the event of a commercial power loss due to storms, hurricanes, etc. The generator serves the majority of the plant and raw water intake stations and provides additional drainage station capacity.

Two steam-driven distribution pumps are located at the power plant. Pump A rehabilitation was completed in March 2014 and Pump B was completed at the end of 2015. Pump B is currently being tested to ensure the pump is operating properly. The Claiborne Pumping Station, consisting of four water distribution pumps (two 60 Hz drive and two 25 Hz drive), and the Panola Station, consisting of two pumping units (each with a 25 and 60 Hz motor), are usually adequate (with 100% redundancy) for pumping finished water to the distribution network. The 25 Hz pump at Panola Station has been converted to operate on both 25 and 60 Hz power for more pumping operation redundancy. The water hammer program will provide for the replacement of equipment and associated valves at the Panola, A & B Pump Room and Claiborne pumping stations. Two elevated tanks will also be installed to provide surge protection to the distribution system. These projects are currently being bid.

Storm-proofing projects for critical SWBNO facilities, including the power buildings, were recently completed by USACE. Improvements for the power buildings include reinforcing the walls, roofing, doors, and windows. Additional damage-related work from Katrina primarily includes valve replacement and repair to electrical components and controls. Related items for the water pumping and power unit are in various stages of design or construction. Additional projects include replacement of the diesel storage tank with two new above ground-tanks that have a total capacity of 250,000 gallons. This project is currently under construction.

The water pumping and power unit has 75 current employees. Power for continued operations of the water, sewerage, and drainage systems requires staffing 24 hours per day, 7 days a week. Given the current levels of staffing, overtime is required to cover all the necessary areas within the pumping and power unit. In addition, approximately 18 senior operators or supervisors are set to retire in five years or less. Retirement was mentioned as the main staffing problem in this department, especially at higher pay levels, such as turbine and boiler operations positions. Additional staff will need to be hired and trained to fill these future vacancies due to retirement.

Central Control

The Central Control Power Dispatching Department is primarily responsible for the delivery of an adequate supply of board-generated electrical power, the continuous monitoring of the operational status of all electrical switchgear, and the testing of related electrical feeders and equipment. This department is also responsible for verifying and enforcing the board's safety clearance procedures and associated clearances within the power distribution system. In addition, this department monitors local and regional weather to provide advance warning of storms, which could affect power generation requirements for the drainage and sewerage systems. Coordination of various power supplies, including alternative backup power supplies such as diesel generators and frequency changers, also comprise part of this department's responsibilities. The Central Control Power Dispatching Department plays a vital role in many emergency operational situations. Serving as a hub of communications, Central Control informs the board's management and senior level staff of changes in conditions that will affect the board's ability to provide adequate sewerage, water, and drainage services. Central Control also provides valuable information during emergencies such as hurricanes,

floods, freezes, etc., to the Office of Emergency Preparedness through established board protocols. Lack of staffing continues to be a major issue for this department.

SEWAGE TREATMENT PLANTS

Operations and maintenance activities of both plants have been contracted to Veolia Water. A representative of the SWBNO oversees the contract operator. This representative works in the Operations Department, which is within the SWBNO, for the Operations Department. Both treatment plants were operational at the time of the site visits and were meeting the discharge limits according to treatment plant personnel. The contract to operate both facilities was recently bid; Veolia won the contract and will continue to be the contract operator for the next nine years.

East Bank Sewage Treatment Plant

The East Bank Plant has a treatment capacity of 122 mgd (dry weather). The plant is currently receiving approximately 100 mgd of flow. In 2015, average flow for the plant was 94.07 mgd, which was greater than the 2014 average of 93.5 mgd. The treatment facilities at the plant include bar screens, grit removal, a pure oxygen activated sludge system, final clarification, and disinfection. The solids generated during sewage treatment are thickened, dewatered (using belt filter presses), and finally incinerated. A new sludge dryer is currently under design as an alternative sludge treatment system to supplement the existing fluid bed incinerator (FBI).

Effluent Pumps **New Mixer on Reactor 1**

Figure 3 – East Bank Sewage Treatment Plant

The following items summarize the improvements that will be or have recently been performed at the East Bank Plant:

- Reactors 1 and 4 were out of service during site visit. Trains 2 and 3 were online. Rehabilitation and reactor cleaning of Train 1 was completed recently and is awaiting startup. The mixers were replaced with eight new mixers during 2015-2016. Reactor 4 will be rehabbed (currently scheduled for 2017) once Reactor 1 is online.

- LEL sensors were installed in the reactors to monitor explosive gases along its automated valves to make the process safe to operate. This work was completed in 2016.
- There is no automation for the mechanical rake on the bar screens and raking must be conducted manually at regular intervals. A project to install automated rakes with controls is being performed in house and will be completed by the end of 2016.
- A temporary, above ground replacement line is being used to return sludge from the return activated sludge pump stations to the influent channel. The permanent repair design was completed and awarded in 2015. The construction was completed in early 2016 and RAS Pumps 6 and 9 are currently tied into the line. RAS Pumps 7 and 8 will be tied into the line by the end of 2016 and at that point, the temporary line will be taken out of service.
- The scum arm on the secondary clarifiers was not in operation at time of field visit; however the plant operator indicated that the clarifiers needed additional steel repairs and that the repair will be included as part of that project when it goes out to bid in 2016.
- The operator noted the liquid oxygen tank is near the end of its useful life. High purity oxygen system components appeared in good condition. Currently, the contract operator is waiting for quotes from vendors for the tank replacement and is planning to complete in 2016.
- Several mechanical mixers on aerobic reactors were out of service due to regular preventative maintenance. These mixers will not be repaired due to the pending installation of the new mixing system in 2017.
- Effluent pumps appeared to be in fair condition. The operator noted that there have been difficulties keeping these pumps operating reliably due to electrical system issues. The electrical system is being evaluated and will likely require upgrades to increase the reliability of the effluent pumps. A 2400 V Effluent Pump electrical distribution system along with switchgear and VFDs is in design phase and was bid in 2015. Project will begin in August 2016.
- Piping installation from the clarifiers to the wetlands demo and expansion cells were completed in 2016.
- The FBI wet scrubber will be replaced in 2016 or 2017. The incinerator will be taken offline for several months and at that time bricks will be replaced in the walls and ceiling of the FBI.
- The multi-hearth incinerator was decommissioned and removed from the site in 2016.
- A new waste pump in the south pump house will be added to satisfy the EPA's request for pump redundancy.
- A new concrete wall was installed in the sedimentation basin to prevent wastewater from entering the effluent channel to prevent future fecal hits in effluent.
- Replacement of the VSA oxygen system equipment (blowers, motors) is currently being solicited for quotes by the contract operator.
- The ferrator is in service and disinfects the effluent to the wetlands.
- The auto transfer switch is needed to automatically transfer power from two onsite feeders if one fails. Currently this is done manually and requires special personal protective equipment (PPE) and time (at least 30 minutes) to transfer power from one feeder to another to keep the plant online.

- A project to convert gas chlorine to sodium hypochlorite is being considered because of safety concerns. Currently the plant uses rail cars to obtain gas chlorine for disinfection.

The average influent TSS and BOD concentrations for 2015 were approximately 130 milligrams per liter (mg/L) and 96 mg/L, respectively. Effluent quality has been adequate over the last year, with an average effluent TSS concentration of 12.8 mg/L and an average effluent BOD concentration of 17.8 mg/L. Seven permit violations occurred in 2015. Five fecal coliform maximum day limit violations occurred in June 2015. The fecal violations in June 2015 were due to a contractor pumping grit from Reactor 1 when solids were accidentally released into the effluent channel. This facility's permit expired two years ago and a renewal was sent to DEQ on time. SWB is in communication with DEQ and is awaiting a draft permit to review and accept.

West Bank Sewage Treatment Plant

The West Bank Plant has a treatment capacity of 20 mgd (dry weather). The plant is currently receiving approximately 9 mgd of flow. The West Bank treatment facility consists of bar screens, primary clarifiers, trickling filters, final clarifiers, and chlorine disinfection. Primary and secondary solids are co-thickened in a gravity thickener and hauled to the East Bank facility for incineration.

New Grit Pumps **Valve repair on West Primary Clarifier in progress**

Figure 4 – West Bank Sewage Treatment Plant

The following items summarize the improvements that will be or have recently been performed at the West Bank Plant:

- Concrete and pavement adjacent to the bar screens and aerated grit basins showed cracks and settling.
- Bar Screens 1, 2, and 4 are operational. Bar Screen 3 was recently rehabbed and needs additional adjustments to treat at full screen capacity.

- Grit cyclones for collecting grit from the grit basins exhibited significant corrosion. Two grit classifiers were replaced in 2014 and 2015.
- Three grit pumps were replaced in 2016.
- Aerated Grit Basin 2 was cleaned in 2016.
- Primary sedimentation basins' weirs and rotating arms showed significant corrosion.
- The West Primary Clarifier was rehabbed in 2015-2016 and will be painted by the end of this year.
- The West Primary Clarifier also had a leaking valve during the site visit. The Central Primary Clarifier will have center well repairs conducted, but as of the site visit the time frame was not known.
- Main Collection Basin Pump 3 had impeller replacements and rehabilitation work completed in 2016. Pumps 1 and 2 will be checked and rehabbed later this year or early 2017.
- The structural condition of the trickling filters appeared to be good. Minor structural issues with Trickling Filter No. 1 were noted and are getting worse since the site visit in 2015.
- The drive motor for the arms on the trickling filters is currently inoperable and operates based on hydraulics; however, treatment is still acceptable.
- Pump 2 was offline during the 2015 site visit due to an additional inoperable valve. Maintenance removed and repaired the valve in 2015.
- The SCADA system was down during site visit conducted in 2015. The SCADA was reloaded and is currently online and operational. Minor upgrades to the system are ongoing and should be complete by the end of 2016.
- Influent flow meter is currently not operational. The meter is ordered but requires coordination between contract operator and SWB staff to complete installation.
- A sludge pump on East Primary Clarifier needs to be replaced and is scheduled to be replaced in 2016 or 2017.
- Auto transfer switch is needed to automatically transfer power during a plant outage. Currently this is done manually and requires special PPE and time (at least 30 minutes) to transfer power to keep the plant online.
- A project to convert gas chlorine to sodium hypochlorite is being considered due to safety concerns. The project was bid and awarded in 2016. Construction should begin later in 2016. Currently the plant uses one-ton cylinders to obtain gas chlorine for disinfection.
- A valve replacement program is underway and requires a utility locate a contractor to assist in locating lines and buried valves. The contract operator is currently working with 811 (call before you dig) for assistance before digging.

The monthly average TSS and BOD influent concentrations for 2015 were approximately 106 and 97 mg/L, respectively. The monthly average effluent TSS and BOD concentrations for 2015 have been approximately 10.1 and 8.3 mg/L, respectively. The average flow for 2015 was 9.1 mgd, which is approximately the same as in 2014 at 9.2 mgd. For 2015, this plant has met or exceeded all permitted effluent limits.

SEWERAGE AND DRAINAGE PUMPING STATIONS

Site assessments of the drainage pump stations (DPS) and sanitary sewer lift stations (SLS) of both the East Bank and West Bank of New Orleans were conducted from late May to the first week of June. A Black & Veatch operations specialist was present for the inspections conducted on May 19, 2016, with Julien Engineering representative and SWB staff. The observation report and accompanying table details the operational status of each SLS and DPS across the city of New Orleans. Pumps that were not turned on at the time of the observations were deemed to be either "in service" or "out of service" based on direction from Sewerage and Water Board supervisors or pump station operators.

Upon inspection, all DPSs and SLSs are considered operational either from permanent pumps or the use of temporary pumps. Storm related construction repair and various station improvements have been recently completed at some stations but are ongoing at others. These repairs will increase the probability that the stations remain functional in the event of a major storm or power loss. The repairs include, but are not limited to, the installation of industrial capacity generators, fuel storage tanks, electrical transformers, and storm proofing of pump motors. Several of the stations have undergone structure-related storm proofing measures, as well as including new storm windows and doors. Additionally, many station rooftops, wall framings, and doors have been reinforced to provide greater resistance to the forces sustained due to hurricane wind gusts.

It should be noted that some stations did not have completed repaired at time of inspection or are out of service due to pump maintenance issues. Three SPSs (Station 6, Dodt, and Plum Orchard) are under construction and are using portable pumps at each of these locations. Five SPSs (Burke, Lawrence, Bullard, Lamb, and Lake Forest) have been recently completed and are now in service. There are no DPSs under construction, as the last two stations have been recently completed at Dwyer and Station 5 within the past two years. While all stations are operational, several stations are not at full capacity due to inoperable pumps or the use of temporary pumps.

FACILITY MAINTENANCE

The Facility Maintenance Department consists of four units: (1) Plant Maintenance, (2) Welding & Fabrication, (3) Electrical Maintenance, and (4) Mechanical Maintenance. These units provide meter repairs, removals and installations, major electrical, welding, and fabrication, as well as mechanical maintenance for all SWBNO facilities throughout the system, with the exception of Veolia Water operated sewage treatment plants. The Facility Maintenance Department possesses the specialized equipment and technology necessary to maintain the plant process equipment, drainage pumping stations, sewage pump stations, power generation equipment, and water meter servicing. Automated lathes and mills located in the machine shop and break press, as well as shear and other specialized repair equipment located in the welding and fabrication shop, provide the ability to fabricate parts when replacement parts are excessively expensive or no longer available due to equipment vintage such as gears and parts for older valves.

In addition, new facilities such as Turbine No. 6 have been built within the SWBNO system, which requires additional staff to both operate and maintain. These additional assets prevent in house rehabilitation and preventative maintenance from being completed, which creates a large backlog of work for this department. Currently, one of their major rehab projects, L3 Sedimentation Basin, includes a complete rebuild of gearboxes, drives, paddles, and other equipment and is planned to be completed in about a month, but is not able to keep on schedule due to limited staff. Previous basins

were contracted out; however, this department mentioned that many times that requires them to inspect and at times redo the work contractors have done to keep the system online. Additional rehab work includes bearing work on Drainage Pump Station 11, which is also delayed due to current staffing levels.

Currently, the Facility Maintenance Department has 60 authorized positions. Most of the highly skilled positions (welding and fabrication, electrical, mechanical maintenance) remain vacant. The department is working on getting those vacancies reopened through Civil Service. It was noted during the interview that the residency requirement, as well as pay scales, prevented hiring permanent staff in this department. Additionally, staff mentioned equipment used to conduct work has reached its useful life, such as equipment used to find high voltage lines, bucket truck, welding trucks, and other equipment.

Currently, overtime is necessary to compensate for the limited workforce. More work is being contracted out to subcontractors that was usually done in-house prior to Hurricane Katrina. Many of these contractors are not local and are not always able to provide timely service for critical pieces of equipment. The department is presently facing a lack of qualified personnel to adequately supervise or oversee subcontractors. Approximately 27.9 percent of the Facility Maintenance employees are currently eligible for retirement or will be eligible to retire within five years, including the department head. Thirteen positions (mostly high level senior supervisors in the machine shop) are currently on drop and could leave in the next five years. Three supervisors personnel, including the department head, are all scheduled to retire by the end of 2016 and do not have a planned replacement. The department is actively recruiting at job fairs, and trade schools. SWBNO is working on a partnership with a local community college to start a trade program for skilled trades and plans on hiring from that pool of students. Staff noted that they are working with Civil Service Department to assist in creating more representational job descriptions to gain experience and interested personnel.

ENGINEERING

The Engineering Department includes Mechanical Engineering, Electrical Engineering, Civil Engineering, Construction Administration and Inspection, and Networks Engineering. The Engineering Department administers major contracts throughout the SWBNO facilities and coordinates with other agencies for the design and construction activities impacting SWBNO-maintained facilities. Currently, the department manages over 60 project contracts for both FEMA and capital improvement projects.

The status of major contracts administered through the Engineering Department is itemized in the following list:

- New sludge line to the river from the Carrollton WPP is at 80 percent design. Construction should begin in 2017.
- L3 sedimentation basins improvements are ongoing, including replacing static mixers with vertical mixers, adding speed controllers, and repairing flocculator drives. Rehabilitation of L3 should be completed by the end of 2016.
- The SWBNO plans to add a sludge dryer to the East Bank plant. Part of that project is the addition of a new air emission system, which is currently under design.

- An arc flash study is being conducted on electrical equipment for safety purposes and as part of various electrical upgrades at WPPs.
- Chemical feed storage improvements to add additional chemical storage at the Carrollton WPP.
- The filter backwash pump replacement is currently in design phase (60 percent) and will be under construction in 2017
- The water hammer project, which will install two new elevated tanks at Carrollton WPP, is currently out to bid.
- The recycle pump improvements design is complete and construction will end in 2016.
- Rehabilitation of Turbine 4 is ongoing and will be completed by the end of 2016.
- Filter media rehab at Algiers WPP is currently scheduled but has not begun. New instrumentation was added to the filter galleries to display flow and headloss.
- Building or upgrading the city canal system at Florida and Louisiana avenues is currently under construction.
- G4 Basin repairs at Carrollton WPP are currently in the bid phase.
- A recent emergency repair of river intake stations hit by a ship is in progress.
- Rehab of Clarifier 2 at East Bank plant is in the design phase.
- New sludge dryer at East Bank plant is currently at 60 percent design.
- New RAS line at East Bank plant is complete and work is being done to tie the RAS pumps into the line before taking the temporary line off-line. This tie-in should be completed in 2016.
- The piping from the East Bank plant to the expansion and demonstration cells was completed in 2016 and tree planting should start in 2016. The A2 project is currently on hold.
- Flood mitigation contracts for nine sewage pump stations were awarded and the Engineering Department is supervising these contracts. Eight stations are currently under construction and scheduled to be completed by the end of 2016 and one Station is currently under design.
- At Carrollton WPP, fuel tanks are being replaced with a 250,000 gallon above-ground storage tank, which is currently under construction.
- A power plant project to improve valves, steam line, auxiliary power, and address steel was bid and work is ongoing.
- 10 major underground 25 cycle electrical feeders are being replaced throughout the SWBNO facilities. The project is currently under construction. This project is the first design-build project for the SWBNO.

Additional projects planned by the Engineering Department include the following:

- Old River Intake Station rehabilitation.
- The bulk sodium hypochlorite systems at the East and West Bank wastewater treatment plants are being replaced with gas chlorine.
- Turbines No. 5 and 3 are being rehabilitated.

- New lime storage and feed facilities at both WPPs.
- A new chemical storage and feed facility at Carrollton WPP.
- A new filter gallery addition at the Carrollton WPP.
- Various water projects that include filter rehab, valve rehab, and pump replacement.

In addition to contract administration, the Engineering Department is currently adding geographical information system (GIS) technology to further enhance tracking water distribution and sewer piping capabilities. The FEMA-funded water main replacement and emergency sewer system assessment requires GIS to identify and fix broken or leaking pipes in the water distribution and collection system. It was noted during the interview that funding for drainage improvements projects is needed. In terms of staffing, the department needs to hire more electrical engineers (due to upcoming retirements) to manage electrical contracts and review electrical design work.

NETWORKS

The Networks Department is charged with maintaining the sanitary sewer system and the potable water distribution system. The water distribution network that was damaged by uprooted trees and other debris during Hurricane Katrina has not been fully repaired. Consequently, the Carrollton WPP is currently purifying approximately 135 mgd of water while serving 92 percent of the pre-Katrina number of accounts. Prior to the levee failure caused by Hurricane Katrina, the plant was purifying approximately 115 mgd of water.

The Networks Department is divided into seven zones. Zone 2 operates the barricade unit making street and lane closures, providing visibility around maintenance sites, and performing preventive maintenance activities such as exercising valves and maintaining fire hydrants. Zone 7 has the after-hours crews, which respond to emergency calls and provide limited surface restorations for repair excavations. Zones 1, 3, 4, 5, and 6 represent geographical areas in New Orleans that provide repair services for their respective areas. Each zone has a staff of approximately 20 to 35 persons who are responsible for repairs within the designated areas. Typically, a three-man crew will complete a work order. More complex work orders may require additional crews on a single work order. Contractors are used to supplement repair work performed within each of the areas, if sufficient manpower within the SWBNO is not available to perform necessary repairs.

According to SWBNO personnel, the biggest challenge is to keep up with the rate of repairs needed due to the increased decay rate of the distribution and collection systems. The Networks Department is finding it harder to keep up with the amount of reactive repairs occurring within the systems with current staffing levels. It was also noted that the increase in residential development (new installations) and increase in city events (runs, bike-a-thons etc.) has also created additional work load, as well as delays in completing work within the systems. Lastly, equipment (backhoes, excavators, flush trucks) and fleet breakdowns have also been an issue over the last year.

The SWBNO conducted a system evaluation of the piping system to detect leaks. The effort to find leaks is ongoing and the department is trying to focus more on lining and replacement, as well as repairs in both the water distribution system and sewer collection system. In terms of staffing, the department is very short-staffed both in engineering and maintenance. The department recently lost

several key engineering personnel that provided technical support and contract management. More senior level engineering staff, as well as engineering interns, is needed to train less experienced staff, provide technical support to the crews, and manage contracts. Additionally, high turnover was noted as a problem in the crews by civil service due to a lack of qualified candidates. The department does have an internal training program for maintenance and engineering staff. Over 1,500 water mains were repaired in 2015. Identification of leaks is ongoing and the SWBNO will continue to incorporate identified leaks into the water main replacement program funded by FEMA. As part of the ESSA program, manholes are also being inspected as an ongoing inspection of the sewer system. Over 1,900 sewer repairs were completed in 2015. In addition to the FEMA-funded projects, Networks also responds to requests for valve closures by contractors and the city.

The Networks Department works in conjunction with the New Orleans Fire Department to monitor and maintain all fire hydrants located in the SWBNO's service area. The Networks Department inspects all fire hydrants within the system. All city hydrants have been mapped and assigned an identification number. The fire hydrants program requires the 16,500 fire hydrants in the database be inspected once every two years to supplement the semiannual inspection cycle of the Fire Department. In 2015, the department inspected over 6,300 hydrants.

The Networks Department completed over 4,000 paving projects in 2015, both in-house and in cooperation with contractors. This department has several maintenance contracts to assist with the maintenance of the water distribution, wastewater collection, and drainage stations. These contracts have increased the amount of work accomplished within the division.

SUPPORT SERVICES

The SWBNO owns 790 pieces of rolling stock, which includes trucks, backhoes, and sewer cleaning equipment. The available equipment is being assigned to the various divisions based on the needs of all departments. Forty six new pieces of stock (trucks, pump trailers etc.) were obtained by the department in 2015 and an additional 38 pieces of new stock were obtained as of May 17, 2016.

The Support Services Department performs most all-ground maintenance functions. In addition, Support Services operates the warehouse that stores valves, pipe, hydrants, tools, etc., required by the Networks Department for repair of existing water distribution and sewer pipelines.

Support Services also operates garages for vehicle repair. The garage areas were heavily damaged during Hurricane Katrina. Garage 1 was rehabbed in 2015-2016. Currently, the contractor is working on punch list items with substantial completion scheduled for July 2016. Additional electrical work needs to be completed by the SWBNO and once that work is completed, an occupancy permit will be issued by the building department. This work and permit are expected to be completed by 2016. Garage 2 is currently being rehabbed and has been delayed due to electrical work and should be complete in early 2017.

A new Site Relocation Facility was constructed in 2014 to house personnel until the garage renovations are completed. Currently staff and materials from both garages are being stored in the site relocation building. Ultimately, the Site Relocation Building will also be used to house the Body Repair Shop of Garage 2.

FEMA continues to reimburse equipment and tools for each garage lost to the hurricane in addition to replacing some of the buildings, such as the Annex Building, which will be used to house locker rooms, shower facilities, training rooms, CDL training unit, etc. Various other projects being completed or being conducted within Support Services are:

- Six new vacuum trucks were purchased in 2015 and arrived on site in 2016. Support services are currently leasing five trucks to ensure enough trucks are available.
- Reduction in take home vehicles is ongoing from 2015.
- A new contractor was assigned to mitigate problematic vegetation (lilies) in the canal systems in 2015 and has made significant headway on the reduction of lilies. The department continues to use this contractor for mitigation.
- New contract for security for all SWBNO facilities was recently awarded and went into effect using a new security contractor.
- Support Services is now required to coordinate with Facility Maintenance for day-to-day activities and needs at the WPPs. This department is focusing on staffing the ground maintenance department to maintain a larger portion of the SWBNO facilities. Currently, a contractor is used for the East Bank and the department maintains the West Bank.
- Major change to janitorial services occurred in 2016 to include more facilities.
- Hiring new employees in all areas of support services including mechanics etc. to help support all departments within SWBNO. The department noted that most of the staff is approaching retirement age and, as a result of these retirements, will be short staffed.

Future projects/concerns:

- HVAC system at the St. Joseph building is in need of rehabilitation. Currently, it is not effective in keeping the building cool at all times. The conceptual design was completed in early 2016 and is scheduled to rehab the HVAC in late 2016.
- One elevator in the St. Joseph building is inoperable. Repairs or replacement is needed. The Engineering Department is working on bid documents and the project should be completed in 2017.
- A new building generator is being installed at the St. Joseph building. The building is currently on a portable generator. The project will include a new generator with an automatic transfer switch.
- The Central Yard Facility plans to add an additional parking lot and replace the fence around the building. This project is on hold due to planned street work.
- Support Services phone system will be upgrade once the Carrollton WPP is completed. This project is still pending.

ENVIRONMENTAL AFFAIRS

The Environmental Affairs Department oversees the consent decree and all administrative orders. This department reports there are sewer bypasses and overflow to the Region 6 EPA. Some activities being undertaken by the department include those listed below:

- Continue to monitor industrial users through the pretreatment program.
- Permit compliance in air, water, wastewater, storm water management, solid waste, and underground fuel storage tanks.

The construction of the piping for the East Bank Sewage Treatment Plant wetlands assimilation has been completed. The piping allows treated effluent to be discharged to the demonstration and expansion cells. Currently, SWBNO has a permit from LDEQ to discharge to the demonstration cells but currently no permit has been issued to discharge into the expansion cells. SWBNO began discharging to the demonstration cell in May 2016. Cypress and tupelo trees will be planted in the demonstration cells in 2016. LDEQ has not processed the permit application for the East Bank Wastewater Treatment Plant and cannot discharge into the expansion cells until a permit is issued. The construction of the A2 project, a joint agreement of a wetlands assimilation project between St. Bernard Parish and SWBNO has not been finalized and construction has not begun.

The components of the pretreatment program include monitoring the discharge of the East and West Bank Sewage Treatment Plants in addition to other significant industrial users during the year. One additional user was permitted in 2015 (Churchill Downs Louisiana Horseracing Company, LLC d/b/a Fair Grounds Race Course). An annual report is also submitted to LDEQ to demonstrate pretreatment performance.

In addition, yearly revenue has been received from the following sources associated with the pretreatment program:

- Industrial users billed monthly for excess strength surcharges.
- Sanitary sewerage discharged to the wastewater plant from special events.
- Septage disposal program.

The total revenue received in 2015 from these sources was $1,034,527.61.

No air permits were obtained in 2015. The use of diesel powered units to provide emergency power to drainage pump stations and other SWBNO facilities required these facilities to meet air quality regulations.

SWBNO continues to utilize compliance software for air quality programs at the Carrolton WPP. All Title V Air Permit reports for the East Bank Sewage Treatment Plant and were filed on time and there were no permit violations in 2015.

The Municipal Separate Storm sewer system (MS4) Permit for Orleans Parish is managed by the SWBNO. The Board, along with co-permittees, met the requirements found in the permit and was documented in the annual report filed on May 1, 2015.

Environmental Affairs used a contractor for stormwater sampling required for the M4 permit. The department purchased sampling equipment in 2016 and sampling is now done completely in-house by department staff. All required samples were successfully collected by department staff to meet 2015 permit requirements. Additional projects this department includes starting a Fats, Oils and Grease (FOG) program were the SWBNO will be issuing permits to restaurant with grease traps. The SWBNO will also continue with its green infrastructure pilot program which focuses on community outreach and education. The Environmental Affairs Department needs to hire more staff for the tasks

necessary to maintain compliance with all the various rules and regulations which apply to the SWBNO. They are in the process of hiring more staff such as a Senior, Associate and Intern level City Planners, one Environmental Technician II, and five Environmental Technicians I to assist with ongoing tasks. The department did not express concerns about finding qualified candidates for these vacancies.

STATUS OF CONSENT DECREE FOR SEWERAGE SYSTEM

The SWBNO is complying with the EPA Region 6 and Department of Justice consent decree, which requires cessation of unauthorized discharges and the development of a schedule for repairs to both the collection system and the treatment plant.

Some provisions outlined in the consent decree include those listed below:

- Quarterly and annual reporting requirements are to be submitted to the regulatory agency.
- The SWBNO will meet the preventive maintenance requirements of the consent decree.
- Collection system repairs will begin once the hurricane damage to the sewage pump stations has been repaired.

The SWBNO is in compliance with the consent decree. It has met every construction and reporting deadline in the decree and has had no fines related to construction or reporting schedules in 2015.

SUMMARY OF FINDINGS

The following items are a summary of the findings during the site inspections:

- The management team consists of individuals with significant water, sewerage, and drainage experience. This experience has been developed both internally at SWBNO and at other respected water and sewer utilities.
- Similar to water and sewer utilities across the U.S., the SWBNO departments are faced with a significant number of pending retirements. Approximately 24 percent of current employees are either on the deferred retirement option plan (DROP) or are eligible for retirement. Unless these employees are replaced with qualified individuals, these pending retirements pose a significant threat to SWBNO's ability to perform its core operational and administrative functions. Succession planning and recruitment of qualified employees will be a key element for SWBNO to mitigate the pending retirements.
- Many key system-wide projects that were in design phase in 2015 are currently out to bid and will be under construction such as the water hammer project.
- Several departments are experiencing vacancies, including the Water Purification unit of the Operations Department, as well as the Facilities Maintenance and Networks departments. SWBNO needs to address these vacancies as soon as possible to ensure effective operational and maintenance performance and administrative oversight. Additionally, it was noted while on-site that there is a need for training programs, especially for WPPs operations staff. It was recommended at the site inspection that process operations manuals be developed for the WPPs to provide guidance to entry level and senior level operators to ensure the WPPs are operated consistently.

- The SWBNO has a clear understanding of the existing conditions of the drainage, water and sewage facilities, and is aware of the immediate needs within each division and area; however, funding is needed for the SWBNO to address these issues. Water and sewer customer rate increases have been approved and the SWBNO is currently prioritizing immediate needs such as filter rehabilitation at the Carrollton WPP.
- The SWBNO has started to initiate the filter rehabilitation program at the Carrollton WPP, as the filter system is in need of extensive repairs due to leaking pipes, broken valves, broken actuators, and filter media being at the end of its expected service life. Media rehab is underway at the Claiborne filter gallery and scheduled for the Algiers WPP.
- The rate of decay of the potable water distribution network and the sanitary sewer collection system presents the two biggest challenges. Lines are being replaced or repaired where leaks have been detected by the contractor. Networks Department has experienced high turnover rates in staff in the maintenance crews as well as in the Engineering Department recently. This situation has added to the stress of dealing with the rate of decay and system needs.
- Based on the SPS and SLS inspection, all DPSs and SLSs are considered operational either from permanent pumps or the use of temporary pumps. Three SPSs (Station 6, Dodt, and Plum Orchard) are under construction and are using portable pumps. Five SPSs (Burke, Lawrence, Bullard, Lamb and Lake Forest) have been recently completed and are now in service.
- The sewage plants are meeting permit except for seven excursions in 2015. The seven excursions occurred 7 days in a row at the East Bank WWTP; an onsite contractor accidently placed grit into the effluent channel, which resulted in an exceedance of effluent maximum daily concentration for fecal coliforms. The SWBNO and the contract operator, Veolia, have addressed each issue.

Water Department

ADHERENCE TO WATER REVENUE BOND RESOLUTION REQUIREMENTS

In 2014, the Sewerage and Water Board sold $103,525,000 of Water Revenue and Refunding Bonds. The sale of these bonds has obligated the Board to fulfill the covenants of the current bond resolutions. The covenants are designed to protect the interests of the bond holders. Particular covenants of the Board in the General Water Revenue Bond Resolution pertain to the payment of indebtedness; limitations on indebtedness; covenants and representations of the Board; covenants with credit banks, insurers, etc.; operation and maintenance; free service, completing service, billing and enforcement of charges; sale or encumbrance of the system; insurance; damage, destruction, condemnation and loss of title; records and accounts, inspections and reports; and the capital budget. The Requirements of the 2014 General Water Revenue Bond Resolution adopted on May 21, 2014, (hereafter collectively called the General Resolution) are discussed in this section. Water Department tables are included at the end of this section.

The Board was in compliance with the 2014 General Water Revenue Bond Resolution in 2016.

Payment of Indebtedness; Limited Obligations

The General Resolution obligates the Board and the Board of Liquidation (BOL) to promptly pay the principal and interest on all senior and subordinate debt that are obligations payable from the net revenues of Board.

Limitations on Indebtedness

The Board must not issue bonds, other senior parity indebtedness or subordinate debt unless it complies with Sections 4.03, 4.04 or 4.05 of the General Resolution, as applicable.

Covenants and Representations of Board

The General Resolution gives the Board the power to issue bonds and pledge the revenues according to the resolution. In addition, the Board "… faithfully observe and perform all covenants, conditions and agreements on its part contained in this Resolution, in every issue of Indebtedness issued hereunder and in all proceedings of the Board pertaining thereto."

Covenants with Credit Banks, Insurers, etc.

The Board may make covenants and agreements in a supplemental resolution with any insurer, credit bank or other financial institution that agrees to insure or to provide a credit facility to the Board. These covenants and agreements shall be binding on the Board and all the holders of indebtedness the same as if such covenants were set forth in the General Resolution.

Operation and Maintenance

The Board "… shall establish and enforce reasonable rules and regulations governing the use of and the services furnished by the System, shall maintain and operate the System in an efficient and economical manner shall maintain the same in good repair and sound operating condition and shall make all necessary repairs, replacements and renewals." In addition, all compensation, salaries, fees and wages paid by the Board shall be reasonable. Finally, the Board shall observe and perform the terms and conditions contained in the Sewerage and Water Board Act (Part III of Chapter 9 of Titles

33 of the Revised Statutes of Louisiana, as amended), and "comply with all valid acts, rules, regulations, orders and directions of any legislative, executive, administrative, or judicial body applicable to the System or the Board."

Free Service, Competing Service, Billing and Enforcement of Charges

The Board shall not " … provide any services of the System without making a charge therefor in accordance with the Board's schedule of rates, fees and charges … other than those connections, use or services already in existence or as may be required by law …" In addition, the Board may not "… provide, grant any franchise to provide or give consent for anyone else to provide such services which would compete with the System unless the Board determines that such franchise … would provide services that the Board has determined are not in its best interest to provide and would not materially impair the interests of the holders of indebtedness."

The Board will bill customers for services on the regular basis and if the rates, fee or other charges are not paid when due, the Board shall " … to the extent permitted by applicable laws and regulations, disconnect the premises from the System or otherwise suspend service to such premises until …" delinquent rates, fees or other charges have been paid or a payment plan has become effective.

Sale or Encumbrance of System

The General Resolution requires that, with exceptions, "… neither the System nor any integral part thereof shall be leased, sold, mortgaged or otherwise disposed of …"

Insurance

The Board "… shall continuously maintain insurance with recognized responsible commercial insurance companies against such risks and in such amounts as are customary for public bodies owning and operating similar systems …"

Damage, Destruction, Condemnation and Loss of Title

The Board shall restore "… property destroyed or damaged to substantially the same condition as before such destruction, damage; condemnation or loss of title …"

Records and Accounts; Inspections and Reports

The Board is required to "… keep proper books of records and accounts … showing complete and correct entries of any transactions relating to the System…."

The Board is also required to file with the Board of Liquidation, City Debt an annual report with financial statements audited by and containing the report of a nationally recognized independent public accountant. The auditor's report is to include a statement that during their examination, made in accordance with generally accepted auditing standards, nothing came to their attention that would lead them to believe that a default had occurred under the resolution, or to state the nature of the default.

The Board engaged the firms of Postlethwaite & Netterville and Bruno & Tervalon to comply with this covenant. Financial reports with the Accountants' Certificate have been furnished to the Board of Liquidation, City Debt and have been reproduced for public distribution. The Government Finance

Officers Association (GFOA) has awarded to the Board the "Certificate of Achievement for Excellence in Financial Reporting" for their annual financial reports for 29 years.

Capital Budget

The Board is required to adopt an annual multi-year financial plan for capital expenses for a minimum of 5 future years.

2016 WATER DEPARTMENT OPERATIONS

Funds for the operation and maintenance of Water Department properties were derived from sales of water, delinquent fees, plumbing inspection and license fees, charges for disconnections and reconnections, and from interest earned on available funds. Analyses of the 2016 Water Department operations are discussed in the following paragraphs.

Water Use

According to statistics provided by the Board during 2016 51,561,280,000 gallons of water were pumped by the Water Department. Water sales accounts for 13,106,735,840 gallons and 1,042,722,355 gallons were metered to City departments without charge. Metered treatment plant process water totaled 532,233,700 gallons. The remaining 36,879,588,105 gallons resulted from unmetered uses, such as fire protection; flushing streets, sewers, drains, and gutters; and unaccounted for system losses.

Number of Customers

Table 2 presents a summary of the historical and projected average number of treated water customers for the period 2015 through 2021. Based on year-end billing summaries, the number of monthly billed customers during 2016 averaged 134,872 compared with 133,904 for 2015. Based on year-to-date customer data through August of 2017, it is projected that the Board will average approximately 135,535 open accounts in 2017 and that the number of accounts will continue to grow at approximately 0.3 percent each year.

In addition to regular customers, water is sold to construction contractors and other customers on an irregular basis. The Board, by law, also provides water service free of charge to certain municipal and public connections including the Board itself. In 2016 there were 1,107 connections in this group, compared with 1,119 for 2015.

Billed Water Usage

Table 2 also presents a summary of historical and projected treated water sales. Based on year-end billing summaries, a total of 13,107 million gallons of water sales were billed on a monthly basis in 2016, compared with a total of 13,266 million gallons in 2015. Over the past few years, the Board and other water utilities operating in the United States have experienced minimal to no growth in water usage and in some cases, a decline. As a result, a resistance factor is applied to the projected annual usage per customer for each customer class to reflect the impact of price elasticity and the trend of decreasing per capital demand due to conservation efforts and more efficient water fixtures. Projected water usage for 2017 is based on an analysis of water usage by customer class for 2016 and year-to-date water usage through August of 2017. As a result, the volume of water sold is projected to increase approximately 2.8% in 2017. Due to the application of a resistance factor, the volume of water sold is projected to decrease approximately 0.7 percent per year beginning in 2018.

Operating Revenues

The 2017 schedule of rates for retail treated water service is presented in Table 3 and reflects a 10 percent rate increase over 2016 rates. The rates consist of monthly service charges, which vary by meter size, plus a 4-step declining block volume charge, with the exception of the first block, which is a life-line related charge. Current rates for flat rate fire service are also shown in Table 3. Separate rate schedules, not shown, are used for billing water sold to construction projects and other purposes.

A summary of historical treated water billings and other Water Department revenue is presented in Table 4 for the period 2012 through 2016. The historical revenues shown in Table 4 were developed from detailed records provided by Board Staff. Operating revenues are derived from charges for sale of water and delinquent fees. Sales of water in 2016 were $82,060,525 which, when compared with $76,719,113 for 2015, shows an increase of approximately 7.0 percent. Delinquent fee revenues were $1,098,415 in 2016 which represent a 14.8 percent decrease over 2015 delinquent fees.

Non-Operating Revenues

Also shown in Table 4, non-operating revenue of the Water Department includes interest earned on invested funds, and other income from miscellaneous sources. During 2016, non-operating revenue included $2,097,442 of interest earned from the investment of available funds in the Water System Fund and the Water Revenue Bond Account and $3,102,435 from other sources.

Operation and Maintenance Expenses

Table 5 presents a summary of historical expenses. Expenditures in 2016 decreased about 1.8 percent from 2015 expenditures and increased about 10.8 percent from 2014 expenditures. Historical operation and maintenance expenses shown in Table 5 do not include the non-cash portion of Provision for Claims as recorded in the Comprehensive Annual Financial Report. Estimates of future Water Department claims are included in Line 7 of Table 12.

Capital Budget and Expenditures

Capital expenditures of the Water Department include the cost of replacements and improvements to waterworks facilities, the water distribution system, and the Water Department pro rata share of power projects and general budget costs.

The Water Department's 2016 capital expenditures totaled $40,135,472. The Water Department's capital improvement expenditures for the year are shown in Table 6.

Summary of Operations

The following tabulation shows a summary of the receipts and expenditures of the Water Department during 2016:

Total Revenues	$88,358,817
Operation and Maintenance Expense	76,886,448
Claims	1,847,021
Debt Service Payments	10,222,220
Revenue Primarily Available for Capital Expenditures [a]	**-596,872**

[a] Excludes depreciation.

PROPOSED CAPITAL IMPROVEMENT PROGRAM

Table 7 presents a summary of the projected major capital improvement program for the period 2017 through 2021. Table 7 is based on the Board's amended 2017 Capital Budget and 2017 -2026 Capital Improvement Program. The five-year major capital improvement program costs are estimated to total $534,212,030. About 56 percent of this amount, or $299,282,030, is for recurring annual capital improvements, with the remaining $234,930,000 for major improvements. The proposed routine annual capital expenditures for water system improvements and extensions include $82,199,230 for the Water Department's share of power projects, and $70,630,800 for its share of general budget items.

ABILITY TO FINANCE PROPOSED CAPITAL EXPENDITURES

This section of the report analyzes the adequacy of projected revenues to finance the proposed capital improvements shown in Table 7.

Operating Revenues

Operating revenues of the Water Department consist of revenues from water sales. Projected operating revenues for the years 2017 through 2021 are shown in Table 8. These estimates reflect the rate schedule effective January 1, 2017 applied to the projected number of customers and water usage and are projected to decrease, on average, about 0.5 percent per year throughout the study period due the anticipated decline in water consumption. Projected revenue from adopted revenue increases is also shown in Table 8.

Other Revenue Sources

Based upon past practices, the Water Department can expect to obtain revenues or funds from non-operating sources. These include interest earned on available funds, participation by others, house connection charges, fire connections, fire hydrant relocations, and various other income sources. Also, by Board policy, the Water Department receives one-half of the plumbing inspection and license fees currently projected at $299,700 per year.

Interest income from the investment of funds held for future use depends upon the level of water revenue available for investment and the amount of revenue accrued towards payment of future capital expenditures.

Projections of other revenue sources are presented in a subsequent table, which summarizes the Department's financial position during the financing of projected operating and capital requirements.

Operation and Maintenance Expenses

A summary of projected operation and maintenance expense for the period 2017 through 2021 is shown in Table 9. Estimates of future expenses are based on anticipated future operating conditions and allowances for inflationary factors.

Projections of future operating and maintenance expenses for the study period are based on the Board's amended 2017 Operating Budget and an analysis of the current and anticipated operating conditions and trends.

Debt Service Requirements

Future debt service requirements of the Water Department are made up of principal, interest, and reserve fund payments for currently outstanding and future water revenue bond issues. As of December 31, 2016, outstanding debt obligations consisted of $103,200,000 Water Revenue and Refunding Bonds, Series 2014 and $100,000,000 Water Revenue Bonds, Series 2015.

To adequately fund the proposed capital improvements, additional revenue bonds are indicated as shown in Table 10. It is anticipated that the Board will issue revenue bonds in the amount of $178,000,000 in 2018 and $103,000,000 in 2021. Projected bonds shown in Table 10 for 2017 through 2021 are assumed to be sold at an average annual interest rate of 5.5 percent for a term of 30 years with 1 year of capitalized interest.

The Water Department has borrowed from the City of New Orleans Department of Public Works (DPW) and from the Drainage Department. It is anticipated that these funds will be reimbursed during the study period.

Adequacy of Revenues to Finance Proposed Capital Improvements

Total revenue requirements for the Water Department recognized for purposes of this report include operation and maintenance expense, allowance for claims, debt service costs on major capital improvements financed through the sale of bonds, and expenditures for capital improvements not financed from bond proceeds. Table 11 examines the financing of the major capital improvement program and Table 12 summarizes the financing of operation and maintenance expense, debt service costs on outstanding and proposed bonds, and the transfer of operating funds for major capital improvement financing.

Capital Projects Funding

Table 11 presents the major capital improvement financing plan which summarizes the projected source and application of funds over the five-year study period. The amount of Funds Available at Beginning of Year, shown on Line 1, is $150,580,400. This amount is based on audited data provided by the Board.

Projected revenue bond proceeds, totaling $281,000,000, are shown on Line 2. The amounts and years of issue are developed by considering capital program needs, current policies, other sources of major capital improvement financing, and the debt service coverage requirements of the bond covenants regarding the issuance of parity revenue bonds.

Financing of the major capital improvement program anticipates the transfer of a total of $75,000,000 of operating revenue as shown on Line 3. Other sources of funds available to meet major

capital improvement expenditures are Participation by Others and interest income. Participation by Others, as shown on Line 4 includes anticipated funding by the COE and FEMA. Interest earnings recognize an assumed 1.0 percent average annual interest rate and are shown on Line 5. Line 6 of the table shows the projected major capital improvement funds available each year.

As of December 31, 2016, the Board had $24,890,500 obligated for open contracts and capital jobs as shown on Line 7 of Table 11. Line 8 shows the projected Major Capital Additions to be funded. These costs reflect the total improvements shown Table 7 with 3 percent inflation beginning in 2018. Estimated issuance costs and capitalized interest related to the proposed bond issue amounts are shown on Lines 9 and 10.

Line 11 shows the required deposits into the Revenue Bond Reserve Fund associated with proposed bond issues. The debt service reserve on proposed debt is a three-prong test estimated as the lessor of (i) 10 percent of the original principal amount, (ii) the maximum annual debt service, or (iii) 125 percent of the average annual debt service.

The Total Application of Funds is shown on Line 12 of Table 11. The net End of Year Balance is shown on Line 13.

Operating Fund

Line 1 of Table 12 shows projected Revenue from Charges under 2017 rates as previously presented in Table 8. In 2012, the New Orleans City Council approved eight consecutive annual 10 percent water rate increases beginning January 1, 2013. Revenue from these future annual revenue increases of 10 percent effective January 1, 2017 through January 1, 2020 is shown on Line 2. It is projected that a 6 percent revenue increase will be necessary effective January 1, 2021. The revenue from this proposed revenue increase is also included in Line 2. The date and magnitude of proposed revenue increase in 2021 is based on consideration of two principal criteria, which include: (1) total revenue necessary to meet cash requirements, and (2) total revenue required to meet minimum bond coverage requirements.

Other revenue available for system operations is shown on Line 4. Interest Income available to the operating fund, included in Line 4, is estimated to be 1.0 percent of the average of the beginning and end of year Net Annual Balance, except as the average is affected by identifiable nonrecurring major receipts, transfers, or expenditures during the year. Revenue from Plumbing Inspection and License Fees and Other Miscellaneous Revenue are also included in Line 4 Table 12. Total Operating Revenue is shown on Line 5.

Operation and Maintenance expense, previously projected in Table 9, is shown on Line 6 of Table 12. Line 7 includes the estimated allowance for claims and bad debt expense which is assumed to be 2 percent of projected revenue. Projected Net Operating Revenue from system operations is shown on Line 8.

Lines 9 through 11 present debt service requirements on currently outstanding and proposed senior revenue bonds. Existing debt includes the Series 2014 and Series 2015 bonds. Line 10 reflects projected principal and interest payments on additional revenue bond debt financing of $178,000,000 in 2018 and $103,000,000 in 2021. Proposed debt is assumed to be 30 year, 5.5

percent fixed interest rate bonds issued in March, with 1 year of capitalized interest and equal annual payments of principal and interest.

In July of 2006 the Board entered into a Cooperative Endeavor Agreement with the State of Louisiana to secure proceeds from the State's Gulf Opportunity Tax Credit Bond Loan Program to assist in payment of debt service requirements from 2006 through 2008. The Board has borrowed $77,465,247 on this agreement. No principal or interest was payable during the initial five-year period of the loan, but after that period, the loan began to bear an interest rate of 4.64 percent. Payments for the water portion of principal and interest began in July 2012 and are shown on Line 12 of Table 12 as subordinate debt.

Anticipated non-operating revenue is shown on Line 14.

Line 15 reflects the projected transfer of accumulated net earnings from system operations to assist in major capital financing. Typically, such accumulated net earnings may be used to help recover portions of the annual costs of system operations or to assist in major capital improvement financing. Line 16 reflects repayment to the DPW and the Drainage Department as well as claimants.

The General Resolution requires an Operating Reserve Fund of 90 days of the previous year's operation and maintenance expense; however the SWBNO's Financial Management Policy requires an Operating Reserve Fund of not less than 180 days. Line 17 indicates the projected annual transfers available to meet this requirement throughout the study period. The General Resolution also sets forth the option to maintain a rate stabilization fund. The amount to be transferred to this fund, as well as the timing, is determined by the Executive Director. There are no transfers currently anticipated during the study period as shown on Line 18 of Table 12.

Line 19 indicates the estimated Net Annual Balance from operations remaining at the end of each year.

The balance of operating funds available at the beginning of the year 2017, shown on Line 20, is comprised of the current cash assets and reflects a balance of $6,005,200. The End of Year Balance, which is exclusive of the operating reserve fund and rate stabilization fund, is shown on Line 21.

Lines 22 through 27 demonstrate that the Board is maintaining an operating reserve equal to at least 180 days of the previous year's operation and maintenance expense beginning in 2018.

As demonstrated in Tables 11 and 12, it is anticipated that current revenue sources will be adequate to readily finance both projected capital program requirements and estimated future operation expenses of the Water Department during the 2017-2021 study period examined herein, with the adopted 10 percent revenue increases in 2017 through 2020, and a 6 percent revenue increase in 2021.

Bond Coverage Requirements

An additional consideration in measuring the adequacy of revenues is the provision of sufficient debt service coverage to meet the bond covenant requirements for the issuance of parity revenue bonds. The General Resolution provides that rates shall be maintained at levels which are expected to yield net revenues (as defined in the resolution) equal to at least 125 percent of the annual principal and interest requirement for senior debt and 110 percent for senior and subordinate debt in each fiscal

year. The SWBNO's Financial Management Policy requires coverage at a minimum of 150 percent for senior debt and 125 percent for senior and subordinate debt.

The calculation of net revenue is shown on Lines 1 through 9 of Table 13. The ability of the Water Department revenues to meet revenue bond coverage requirements is shown on Lines 10 through 14. As shown on Lines 12 and 14, the indicated projected revenue and revenue increases will provide sufficient net revenue to meet coverage requirements during the study period.

The General Resolution further prescribes that additional parity revenue bonds may be issued if net revenue from a previous test year (any 12 consecutive months of the last 24 months) is equal to at least 125 percent of the maximum annual principal and interest requirement for senior debt and 110 percent for senior and subordinate debt. For purposes of the additional bonds test, net revenue may be adjusted to reflect any increases not in effect during the selected test year but have been approved by the Board, Board of Liquidation and City Council and will go into effect within the following five years.

The results of the additional bonds test are shown on Lines 15 through 21 of Table 13. Lines 19 and 21 of the table indicate that with the magnitude of the adopted annual revenue increases, required minimum levels of coverage are met in each year with indicated coverage levels ranging from 229 percent to 426 percent.

Table 1

Insurance in Force as of December 31, 2016

Insurer	Coverage	Deductible	Premium
Lexington	Commercial Property	5% per building subject to minimum $500,000 per occurrence for named storm; $50,000 earth movement deductible; $1,000,000 minimum per occurrence for any other peril not excluded	$513,765
Homeland	Commercial Property		$48,930
RSUI	Commercial Property		$28,306
Lloyds of London	Commercial Property		$35,796
Lexington	Commercial Auto Physical Damage	$150,000	$200,827
ACE	Commercial Auto Liability	$1,000,000 SIR/Deductible	$250,000
RSUI	Excess Auto Liability		$75,500
Endurance	Excess Auto LIability		$68,125
Hudson	Fiduciary Liability	$50,000	$20,156
Illinois Union	Public Officials Liability	$250,000	$70,256
Zurich	Commercial Crime	$5,000	$6,335
Beazley	Cyber Security	$25,000 per claim	$33,514

Table 2

Water Department
Historical and Projected Sales and Average Number of Customers (a)

Customer Class	Historical		Projected				
	2015	2016	2017	2018	2019	2020	2021
Single Family Residential (b)							
Customers	116,078	117,202	117,800	118,300	118,800	119,200	119,600
Sales (1,000,000 gal.)	6,567	6,330	6,680	6,645	6,613	6,578	6,546
Sales Per Customer (1,000 gal.)	57	54	57	56	56	55	55
Multi-family Residential							
Customers	4,666	4,678	4,700	4,700	4,700	4,700	4,700
Sales (1,000,000 gal.)	707	702	698	691	685	679	674
Sales Per Customer (1,000 gal.)	152	150	148	147	146	144	143
Commercial							
Customers	11,642	11,501	11,500	11,500	11,500	11,500	11,500
Sales (1,000,000 gal.)	3,234	3,311	3,278	3,247	3,218	3,190	3,164
Sales Per Customer (1,000 gal.)	278	288	285	282	280	277	275
Industrial							
Customers	38	35	35	35	35	35	35
Sales (1,000,000 gal.)	217	162	161	159	158	156	155
Sales Per Customer (1,000 gal.)	5,709	4,634	4,589	4,543	4,503	4,466	4,429
Dual Service & Metered Fire Service (c)							
Customers	1,480	1,456	1,500	1,500	1,500	1,500	1,500
Sales (1,000,000 gal.)	2,541	2,602	2,654	2,628	2,605	2,582	2,561
Sales Per Customer (1,000 gal.)	1,717	1,787	1,769	1,752	1,736	1,722	1,708
Total							
Customers	133,904	134,872	135,535	136,035	136,535	136,935	137,335
Sales (1,000,000 gal.)	13,266	13,107	13,470	13,370	13,278	13,186	13,100

(a) Excludes customers receiving
(b) Includes duplex.
(c) Does not include flat rate fire protection customers.

Table 3

Water Department
Existing Water Rates
(Effective January 1, 2017)

Rate Components			General Service	Dual Service (a)
			$	$
Monthly Water Service Charge				
Meter Size Inches				
5/8			6.53	8.87
3/4			7.99	10.79
1			10.14	14.18
1-1/2			16.74	22.07
2			22.07	31.57
3			49.93	70.06
4			86.97	122.41
6			170.72	238.36
8			252.86	354.31
10			343.04	479.93
12			402.63	563.68
16			536.29	750.51
Monthly Water Quantity Charge - per 1,000 Gallons				
First	3,000	gallons	4.35	4.35
Next	17,000	gallons	7.41	7.41
Next	980,000	gallons	5.83	5.83
Over	1,000,000	gallons	4.88	4.88
Flat Rate Fire Service				
Meter Size Inches				
2			14.81	
3			20.13	
4			37.04	
6			64.42	
8			85.35	
10			135.28	
12			175.55	
16			241.58	

(a) Includes Dual Service and all metered fire services.

Table 4

Water Department
Statement of Historical Revenue

Revenue Source	2012	2013	2014	2015	2016
	$	$	$	$	$
Operating Revenue					
Sales of Water	59,208,198	63,248,555	69,601,809	76,719,113	82,060,525
Delinquent Fee	1,048,107	1,150,054	1,216,445	1,288,824	1,098,415
Total Operating Revenue	60,256,305	64,398,610	70,818,254	78,007,937	83,158,940
Nonoperating Revenue					
Interest Earned	92,849	82,893	349,607	966,017	2,097,442
Plumbing Inspection and License Fees	343,903	321,518	339,176	305,384	319,991
Revenue Sharing	123,885	219,877	254,577	258,721	251,002
Other Income (a)	10,851,066	5,234,998	2,459,234	3,418,560	2,531,442
Total Nonoperating Revenue	11,411,703	5,859,286	3,402,593	4,948,682	5,199,877
Total Revenue	71,668,008	70,257,896	74,220,847	82,956,619	88,358,817

(a) Includes $7,617,063 in operating and maintenance grants in 2012, $1,981,568 in 2013, -$381,876 in 2014,$2,405 in 2015 and $24,738 in 2016.

Table 5

Water Department
Historical Operation and Maintenance Expenses (a)

	2012	2013	2014	2015	2016
	$	$	$	$	$
Personal Services	31,410,463	32,375,467	34,802,991	42,333,498	39,659,020
Services & Utilities	12,230,597	15,964,882	16,936,254	17,408,686	17,603,566
Supplies & Materials	17,109,745	14,229,820	14,998,094	18,276,404	19,143,488
Special Current Charges	1,532,863	1,304,502	2,357,932	(103,530)	248,523
Furniture & Equipment	173,656	233,244	298,973	349,610	231,850
Repairs & Facility Maintenance	0	0	0	0	0
Total Operation and Maintenance	62,457,322	64,107,915	69,394,244	78,264,668	76,886,448

(a) Historical operation and maintenance expenses do not include the non-cash portion of provision for claims as recorded in the Comprehensive Annual Financial Report. Estimates of future Water Department claims payable are included in Table 12.

Table 6

Water Department
Capital Expenditures
2016

C.P. #	Project	Actual Expenditures
		$
	Waterworks	
110	Normal Extensions & Replacements	3,483,175
156	Advanced Water Treatment	735,405
175	Water Hurricane Recovery Bonds	4,886,835
180	FEMA Review of Change Orders - Water	11,683,197
	Total Waterworks	20,788,612
	Water Distribution	
214	Normal Extensions & Replacements	2,142,181
215	Rehabilitation - Mains, Hydrants & Services	2,096,192
239	Mains DPW Contracts	(158,500)
	Total Water Distribution	4,079,874
	Power Projects and General Budget	
600	Water Share of Power Projects	5,864,914
700	Water Reserve for Emergencies	233,731
800	Water Share of General Budget Items	9,168,341
	Total Power Projects and General Budget	15,266,986
	Total Water Department	40,135,472

Table 7

Water Department
Projected Capital Improvements (a)

C.P. #	Project	2017	2018	2019	2020	2021	Total
		$	$	$	$	$	$
	Reinvestment in Assets						
110	Normal Extension & Replacement	18,884,000	16,320,000	5,745,000	4,920,000	5,470,000	51,339,000
112	Modification to Oak St. Raw Water Intake Station	1,200,000	5,500,000	5,000,000	0	0	11,700,000
122	Sycamore and Claiborne Filter Rehabilitation	6,625,000	5,050,000	0	0	0	11,675,000
160	SELA Water Relocation Costs	1,300,000	603,000	237,000	578,000	2,145,000	4,863,000
214	Normal Extensions & Replacements	2,535,000	2,535,000	2,535,000	2,535,000	2,535,000	12,675,000
216	Water System Replacement Program	5,100,000	5,100,000	5,200,000	5,000,000	5,000,000	25,400,000
239	Mains In Streets Department Contracts	3,200,000	6,000,000	3,200,000	3,200,000	3,200,000	18,800,000
600	Water Share of Power Projects	51,397,230	15,570,000	9,072,000	3,780,000	2,380,000	82,199,230
701	Water Reserve for Emergencies	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	10,000,000
800	Water Share of General Budget Items	23,595,800	19,767,000	10,479,000	8,160,000	8,629,000	70,630,800
	Total Routine Capital Improvements	115,837,030	78,445,000	43,468,000	30,173,000	31,359,000	299,282,030
	Major Capital Improvements						
135	Improvements to Chemical System	7,370,000	2,100,000	3,000,000	0	0	12,470,000
156	Advanced Carrollton Water Treatment	8,815,000	700,000	20,120,000	120,000	120,000	29,875,000
157	Advanced Algiers Water Treatment	6,940,000	3,900,000	1,000,000	0	0	11,840,000
158	Water Treatment Carr.	200,000	200,000	0	0	0	400,000
159	Water Plant Security Improvements	2,495,000	1,980,000	3,320,000	0	0	7,795,000
175	Water Hurricane Recovery Bonds	40,600,000	23,200,000	44,000,000	33,200,000	31,200,000	172,200,000
221	Feeder Main Extension, General	100,000	100,000	50,000	50,000	50,000	350,000
	Total Major Capital Improvements	66,520,000	32,180,000	71,490,000	33,370,000	31,370,000	234,930,000
	Total Water Department Improvements	182,357,030	110,625,000	114,958,000	63,543,000	62,729,000	534,212,030

(a) The improvements for 2017-2021 are based on the amended 2017 capital budget and 2017-2026 capital improvement program.

Table 8

Water Department
Projected Operating Revenue

	(1)	(2)	(3)
Year	Revenue From Charges	Additional Revenue (a)	Total Service Charge Revenue
	$	$	$
2017	91,193,500	0	91,193,500
2018	90,675,500	8,925,900	99,601,400
2019	90,198,400	18,704,000	108,902,400
2020	89,718,000	29,351,800	119,069,800
2021	89,273,400	30,077,900	119,351,300

(a) Reflects additional revenue from adopted revenue increases.

Table 9

Water Department
Projected Operation and Maintenance Expenses

	2017 (a)	2018	2019	2020	2021
	$	$	$	$	$
Personal Services	36,692,100	37,792,900	38,926,600	40,094,400	41,297,300
Services & Utilities	16,286,600	16,775,200	17,278,500	17,796,800	18,330,700
Supplies & Materials	17,711,400	18,242,700	18,790,000	19,353,700	19,934,300
Special Current Charges	229,900	236,800	243,900	251,200	258,800
Furniture & Equipment	214,500	220,900	227,600	234,400	241,400
Repairs & Facility Maintenance	0	0	0	0	0
Total Operation and Maintenance	71,134,500	73,268,500	75,466,600	77,730,500	80,062,500

(a) Represents the amended operating budget approved on September 20, 2017.

Table 10

Water Department
Debt Service Requirements

	Amount of Issue	2017	2018	2019	2020	2021
	$	$	$	$	$	$
Existing Bonds						
Series 2014		7,700,000	7,693,000	7,700,000	7,690,000	7,683,500
Series 2015		4,940,600	5,640,600	5,694,600	5,783,600	5,787,800
Total Existing Debt Service		12,640,600	13,333,600	13,394,600	13,473,600	13,471,300
Projected Bonds						
2017	0	0	0	0	0	0
2018	178,000,000		0	10,767,500	12,921,000	12,921,000
2019	0			0	0	0
2020	0				0	0
2021	103,000,000					0
Total Projected Debt Service		0	0	10,767,500	12,921,000	12,921,000
Total Debt Service		12,640,600	13,333,600	24,162,100	26,394,600	26,392,300

Table 11

Water Department
Capital Improvement Program Financing

Line No.	Description	Fiscal Year Ending December 31, 2017	2018	2019	2020	2021	Total
		$	$	$	$	$	$
1	Funds Available at Beginning of Year	150,580,400	209,200	83,212,900	15,771,000	4,141,900	150,580,400
2	Revenue Bond Proceeds	0	178,000,000	0	0	103,000,000	281,000,000
3	Operation Fund Transfers	22,000,000	3,000,000	12,000,000	17,000,000	21,000,000	75,000,000
4	Participation By Others	33,944,000	40,265,000	41,917,000	40,648,000	33,035,000	189,809,000
5	Interest Income	932,300	1,063,500	600,000	158,100	782,500	3,536,400
6	Total Funds Available	207,456,700	222,537,700	137,729,900	73,577,100	161,959,400	699,925,800
7	Obligated Contracts & Capital Jobs	(24,890,500)	0	0	0	0	(24,890,500)
8	Major Capital Additions	(182,357,000)	(113,943,800)	(121,958,900)	(69,435,200)	(70,602,000)	(558,296,900)
9	Bond Issuance Expense	0	(2,670,000)	0	0	(1,545,000)	(4,215,000)
10	Capitalized Interest Requirement	0	(9,790,000)	0	0	(5,665,000)	(15,455,000)
11	Revenue Bond Reserve Fund	0	(12,921,000)	0	0	(7,476,700)	(20,397,700)
12	Total Application of Funds	(207,247,500)	(139,324,800)	(121,958,900)	(69,435,200)	(85,288,700)	(623,255,100)
13	End of Year Balance	209,200	83,212,900	15,771,000	4,141,900	76,670,700	76,670,700

Table 12

Water Department
Analysis of Ability of Forecasted Revenue to Finance Projected Revenue Requirements

Line No.	Description	Fiscal Year Ending December 31, 2017	2018	2019	2020	2021
		$	$	$	$	$
1	Revenue from Charges	91,193,500	90,675,500	90,198,400	89,718,000	89,273,400
2	Total Additional Revenue (a)	0	8,925,900	18,704,000	29,351,800	36,642,200
3	Total Service Charge Revenue	91,193,500	99,601,400	108,902,400	119,069,800	125,915,600
4	Other Operating Revenue	7,113,900	7,188,400	7,323,300	7,333,400	7,384,600
5	Total Operating Revenue	98,307,400	106,789,800	116,225,700	126,403,200	133,300,200
6	Operation & Maintenance	(71,134,500)	(73,268,500)	(75,466,600)	(77,730,500)	(80,062,500)
7	Non-Cash Expense Accruals	(3,130,100)	(3,337,400)	(3,563,800)	(3,808,800)	(3,988,500)
8	Net Operating Revenue	24,042,800	30,183,900	37,195,300	44,863,900	49,249,200
	Debt Service					
	Senior Lien Revenue Bonds					
9	Existing	(12,640,600)	(13,333,600)	(13,394,600)	(13,473,600)	(13,471,300)
10	Projected	0	0	(10,767,500)	(12,921,000)	(12,921,000)
11	Total Senior Lien Revenue Bonds	(12,640,600)	(13,333,600)	(24,162,100)	(26,394,600)	(26,392,300)
	Subordinate Revenue Bonds					
12	Gulf Opportunity Zone Act Loan	(639,900)	(639,900)	(639,900)	(639,900)	(639,900)
13	Total Debt Service	(13,280,500)	(13,973,500)	(24,802,000)	(27,034,500)	(27,032,200)
14	Other Non-Operating Revenue	400,500	400,500	400,500	400,500	400,500
15	Transfer to Construction	(22,000,000)	(3,000,000)	(12,000,000)	(17,000,000)	(21,000,000)
16	Due from/(to) Other Departments	(436,000)	(436,000)	0	0	0
17	Transfer to Operating Reserve Fund	0	0	0	0	(208,100)
18	Transfer from/(to) Rate Stabilization Fund	0	0	0	0	0
19	Net Annual Balance	(11,273,200)	13,174,900	793,800	1,229,900	1,409,400
20	Beginning of Year Cash Balance (b)	6,005,200	(5,268,000)	7,906,900	8,700,700	9,930,600
21	End of Year Balance	(5,268,000)	7,906,900	8,700,700	9,930,600	11,340,000
22	Beginning of Year Cash Balance (b)	6,005,200	25,463,802	38,638,702	39,432,502	40,662,402
23	Customer Deposits	11,773,500	0	0	0	0
24	Operating Reserve Fund	18,958,302	0	0	0	208,100
25	Net annual Balance	(11,273,200)	13,174,900	793,800	1,229,900	1,409,400
26	End of Year Balance	25,463,802	38,638,702	39,432,502	40,662,402	42,279,902
27	Days of O&M Cash on Hand	125	184	182	182	184

(a) Reflects revenue from an eight-year series of annual 10% rate increases effective January 1, 2013; adopted by the City Council in 2012 and a proposed 6% annual increase in 2021.

(b) Reflects beginning of year balance in unrestricted and undesignated cash and cash equivalents and cash and cash equivalents designated for capital projects, less operating reserve requirement.

Table 13

Water Department
Coverage Requirements

Line No.	Coverage Requirements	2017	2018	2019	2020	2021
		$	$	$	$	$
	Projected Net Revenues					
1	Revenue Under Existing Rates	91,193,500	90,675,500	90,198,400	89,718,000	89,273,400
2	Additional Revenue Under Proposed Rate	0	8,925,900	18,704,000	29,351,800	36,642,200
3	Interest Income	1,396,300	1,602,000	1,273,400	841,600	1,517,200
4	Plumbing and Inspection Fees	299,700	299,700	299,700	299,700	299,700
5	Other Miscellaneous Revenue	4,155,100	4,155,100	4,155,100	4,155,100	4,155,100
6	Operation & Maintenance Grants	2,195,100	2,195,100	2,195,100	2,195,100	2,195,100
7	Transfer from Rate Stabilization Fund	0	0	0	0	0
8	Operation & Maintenance	(71,134,500)	(73,268,500)	(75,466,600)	(77,730,500)	(80,062,500)
9	Net Revenue	28,105,200	34,584,800	41,359,100	48,830,800	54,020,200
	Rate Covenant Coverage					
10	Projected Net Revenues	28,105,200	34,584,800	41,359,100	48,830,800	54,020,200
	Annual Debt Service					
11	Senior Debt	12,640,600	13,333,600	24,162,100	26,394,600	26,392,300
12	Coverage (a)	222%	259%	171%	185%	205%
13	All Debt	13,280,500	13,973,500	24,802,000	27,034,500	27,032,200
14	Coverage (b)	212%	248%	167%	181%	200%
	Additional Bond Coverage					
15	Preceding Year Projected Net Revenues	11,472,300	28,105,200	34,584,800	41,359,100	48,830,800
16	Future Additional Revenue	45,899,200	45,187,400	39,999,600	35,062,300	30,344,900
17	Adjusted Projected Net Revenues	57,371,500	73,292,600	74,584,400	76,421,400	79,175,700
	Maximum Debt Service					
18	Senior Debt	13,473,600	26,394,600	26,394,600	26,394,600	33,871,200
19	Coverage (a)	426%	278%	283%	290%	234%
20	All Debt	14,113,500	27,034,500	27,034,500	27,034,500	34,508,400
21	Coverage (b)	407%	271%	276%	283%	229%

(a) The General Bond Resolution requires net revenue to equal or exceed 125% of debt service.
(b) The General Bond Resolution requires net revenue to equal or exceed 110% of debt service.

Sewerage Department

ADHERENCE TO SEWERAGE SERVICE REVENUE BOND RESOLUTION

In 2014, the Board issued $158,990,000 Sewerage Service Revenue and Refunding Bonds. Issuance of these bonds obligated the Board to adhere to the covenants of the Bond Resolution. Briefly, the covenants are concerned with:

- Payment of indebtedness; limited obligations.
- Limitations on indebtedness.
- Covenants and representations of Board.
- Covenants with credit banks, insurers, etc.
- Operation and maintenance.
- Free service, competing service, billing and enforcement of charges.
- Sale or encumbrance of system.
- Insurance
- Damage, destruction, condemnation and loss of title.
- Records and accounts; inspections and reports.
- Capital budget.

The provisions of the General Sewerage Service Revenue Bond Resolution are virtually identical to those of the General Water Revenue Bond Resolution described in the preceding section of this report. The Board was in compliance with these covenants in 2016. Sewerage Department tables are included at the end of this section.

2016 SEWERAGE DEPARTMENT OPERATIONS

Funds for the operation, maintenance, and debt service requirements of the Sewerage Department are obtained from sewerage service charges. The balance of revenue remaining after meeting these costs may be used for cash financing capital improvements as required. Other fund sources include participation by others, interest earned on invested funds, and other minor sources.

Revenues and expenditures related to the 2016 operations of the Sewerage Department are discussed in the following paragraphs.

Wastewater Volumes

Number of Customers

Table 14 presents a summary of the historical and projected average number of sewer customers for the period 2015 through 2021. Based on year-end billing summaries, the number of monthly billed customers during 2016 averaged 133,277 compared with 132,264 for 2015. Based on year-to-date customer data through August of 2017, it is projected that the Board will average approximately 133,834 open accounts in 2017 and that the number of accounts will continue to grow at approximately 0.3 percent each year.

Billed Wastewater Volume

Table 14 also presents a summary of historical and projected billed wastewater volumes. Based on year-end billing summaries, a total of 9,992 million gallons of wastewater volume was billed in 2016,

compared with a total of 9,485 million gallons in 2015. Since 85 percent of residential water usage and 100 percent of non-residential usage is treated as billable sewer flows, the decrease in sewage volume billed is similar to the decrease in water usage. After factoring in the number of annual bills rendered, the average annual usage per customer for each customer class and the projected resistance factor, the resulting projected contributed wastewater volume reflects a decrease of approximately 0.7 percent per year.

Operating Revenues

The 2016 schedule of rates for retail sewerage service is presented in Table 15 and reflects a 10 percent rate increase over 2016 rates. The rates consist of monthly service charges, which vary by meter size, plus a volume charge. Quantity charges for single family residential and multi-residential customers are based on 85 percent of the metered water consumption to allow 15 percent for lawn watering and other uses, which contribute no flow to the sanitary sewer. All other classes are based on 100 percent of water consumption. Water from private wells or other non-Board sources that is discharged to the sanitary sewer system is to be metered and the consumption included in computing sewerage service charges. Any customer who can show that only a portion of his metered water usage is discharged to the sanitary sewer system is to be charged for only that portion of the total water quantity. A residential customer may have either the 15 percent allowance or a special exemption, but not both.

A summary of historical sewer billings and other Sewerage Department revenue is presented in Table 16 for the period 2012 through 2016. The historical revenues shown in Table 16 were developed from detailed records provided by Board staff. Operating revenues are derived from sewerage service charge revenue, which includes excess strength charges, and delinquent fees. Sewerage service charge revenues in 2016 were $104,060,458 which, when compared with $94,775,797 for 2015, shows an increase of approximately 9.8 percent. Delinquent fee revenues were $734,725 in 2016 which represent a decrease of approximately 14.7 percent over 2015 delinquent fees.

Non-Operating Revenues

Also shown in Table 16, Sewerage Department non-operating revenue includes interest earned on the investment of available funds and other minor items of revenue. Interest earned in 2016 consisted of $2,301,168 from investments in the Sewerage System fund, the capital projects and construction fund. Miscellaneous income was $1,137,406 for 2016.

Operation and Maintenance Expenses

Table 17 presents a summary of 2012 through 2016 historical operation and maintenance expenses of the Sewerage Department. Expenditures for 2016 increased about 0.4% percent from 2015 expenditures. Historical operation and maintenance expenses shown in Table 17 do not include the non-cash portion of Provision for Claims as recorded in the Comprehensive Annual Financial Report. Estimates of future Sewerage Department claims are shown on Line 7 in Table 24.

Capital Budget and Expenditures

Capital expenditures of the Sewerage Department include the cost of replacements and improvements to wastewater treatment and collection facilities and the Sewerage Department pro rata share of power projects and general budget costs.

The Sewerage Department's 2016 capital expenditures totaled $40,544,444. Capital improvement expenditures for the year are shown in Table 18.

Summary of Operations

The following tabulation shows a summary of the receipts and expenditures of the Sewerage Department during 2016:

Total Revenues	$108,233,756
Operation and Maintenance Expense	58,240,656
Claims	2,380,775
Debt Service Payments	24,616,125
Revenue Primarily Available for Capital Expenditures [a]	**22,996,200**

[a] Excludes depreciation.

PROPOSED CAPITAL IMPROVEMENT PROGRAM

Table 19 presents a summary of the projected major capital improvement program for the period 2017 through 2021. Table 19 is based on the Board's amended 2017-2026 Capital Program and 2017-2026 Capital Improvement Program. The five-year major capital improvement program costs are estimated to total $438,109,000. Of the projected total, $351,179,000 is considered to be for recurring annual capital improvements. The remaining $86,930,000 is for proposed major capital expenditures. Costs of power projects and general budget items are prorated between the Water, Sewerage and Drainage Departments on the basis of relative use. The projected Sewerage Department pro rata share of power projects and general budget item costs for the five-year period 2017 through 2021 total $37,266,200 and $44,255,800, respectively.

The Board is currently complying with the EPA Region 6 Administrative Order. In January of 2010, the Board successfully completed negotiations for a modification of the Consent Decree. The Capital Improvement Program shown in Table 19 represents the schedule for complying with the modified Consent Decree.

ABILITY TO FINANCE PROPOSED CAPITAL EXPENDITURES

This section of the report analyzes the adequacy of projected revenues to finance the proposed capital improvements shown in Table 19.

Operating Revenues

Future operating revenues of the Sewerage Department consist of sewerage service charge revenues which are summarized for 2017 through 2021 in Table 20. These estimates reflect the rate schedule effective January 1, 2017 applied to the projected number of customers and contributed wastewater flow and are projected to decrease, on average, about 0.2 percent per year throughout the study period due to the anticipated decline in water consumption. Projected revenue from adopted revenue increases is also shown in Table 20.

Other Revenue Sources

Based upon past practices, the Sewerage Department can expect to obtain revenues or funds from non-operating sources. These include interest earned from the investment of available funds,

participation by others, and miscellaneous other income. By Board policy, the Sewerage Department receives one-half of the plumbing inspection and license fees, currently projected at $326,100 per year.

Interest income from the investment of funds held for future use depends upon the level of sewerage revenue available for investment and the amount of revenue accrued towards payment of future capital expenditures.

Projections of other revenue sources are presented in a subsequent table, which summarizes the Department's financial position during the financing of projected operating and capital requirements.

Operation and Maintenance Expense

A summary of projected operation and maintenance expense for the period 2017 through 2021 is shown in Table 21. Estimates of future expenses are based on anticipated future operating conditions and allowances for inflationary factors.

Projections of future operating and maintenance expenses for the study period are based on the Board's amended 2017 Operating Budget and an analysis of the current and anticipated operating conditions and trends.

Debt Service Requirements

Future debt service requirements of the Sewerage Department are made up of principal, interest, and reserve fund payments for currently outstanding and future sewerage revenue bond issues. As of December 31, 2016 outstanding debt obligations consisted of $7,333,000 Sewerage Revenue Bonds Series 2011, $135,355,000 Sewerage Service Revenue and Refunding Bonds Series 2014, and $100,000,000 Sewerage Service Revenue and Refunding Bonds Series 2015.

To adequately fund the proposed capital improvements, additional revenue bonds are indicated as shown in Table 22. It is anticipated that the Board will issue revenue bonds in the amount of $158,000,000 in 2018 and $124,000,000 in 2020. Projected bonds shown in Table 22 for 2017 through 2021 are assumed to be sold at an average annual interest rate of 5.5 percent for a term of 30 years.

The Sewerage Department has borrowed from the DPW. It is anticipated that this amount will be reimbursed during the study period.

Adequacy of Revenues to Finance Proposed Capital Improvements

Total revenue requirements for the Sewer Department recognized for purposes of this report include operation and maintenance expense, allowance for claims, debt service costs on major capital improvements financed through the sale of bonds, and expenditures for capital improvements not financed from bond proceeds. Table 23 examines the financing of the major capital improvement program and Table 24 summarizes the financing of operation and maintenance expense, debt service costs on outstanding and proposed bonds, and the transfer of operating funds for capital improvement financing.

Capital Projects Funding

Table 23 presents the major capital improvement financing plan which summarizes the projected source and application of funds over the five-year study period. The amount of Funds Available at Beginning of Year, shown on Line 1, is $151,780,100. This amount is based on audited data provided by the Board.

Projected revenue bond proceeds, totaling $282,000,000, are shown on Line 2. The amounts and years of issue are developed by considering capital program needs, current policies, other sources of major capital improvement financing, and the debt service coverage requirements of the bond covenants regarding the issuance of parity revenue bonds.

Financing of the major capital improvement program anticipates the transfer of a total of $73,000,000 of operating reserves as shown on Line 3. Other sources of funds available to meet major capital improvement expenditures are Participation by Others and interest income. Participation by Others, as shown on Line 4 includes anticipated funding by the COE and FEMA. Interest earnings recognize an assumed 1.0 percent average annual interest rate and are shown on Line 5. Line 6 of the table shows the projected major capital improvement funds available each year.

As of December 31, 2016, the Board had $47,957,300 obligated for open contracts and capital jobs as shown on Line 7 of Table 23. Line 8 shows the projected Major Capital Additions to be funded. These cost reflect the total improvements shown in Table 19 with 3 percent inflation beginning in 2018. Estimated issuance costs related to the proposed bond issue amounts are shown on Line 9.

Line 10 shows the required deposits into the Revenue Bond Reserve Fund associated with proposed bond issues. The debt service reserve on proposed debt is a three-pronged test estimated as the lessor of (i) 10 percent of the original principal amount, (ii) the maximum annual debt service, or (iii) 125 percent of the average annual debt service.

The Total Application of Funds is shown on Line 11 of Table 23. The net End of Year Balance is shown on Line 12.

Operating Fund

Line 1 of Table 24 shows projected Revenue from Charges under 2016 rates as previously presented in Table 20. In 2012, the New Orleans City Council approved eight consecutive annual 10 percent sewer rate increases beginning January 1, 2013. Revenue from these future annual revenue increases of 10 percent effective January 1, 2016 through January 1, 2020 is shown on Line 2. It is projected that a 1 percent revenue increase will be necessary effective January 1, 2021. The revenue from this proposed revenue increase is also included in Line 2. The date and magnitude of proposed revenue increase in 2021 is based on consideration of two principal criteria, which include: (1) total revenue necessary to meet cash requirements, and (2) total revenue required to meet minimum bond coverage requirements.

Other revenue available for system operations is shown on Line 4. Interest Income available to the operating fund, included in Line 4, is estimated to be 1.0 percent of the average of the beginning and end of year Net Annual Balance, except as the average is affected by identifiable nonrecurring major receipts, transfers, or expenditures during the year. Revenue from Plumbing Inspection and License

Fees and Other Miscellaneous Revenue are also included in Line 4 of Table 21. Total Operating Revenue is shown on Line 5.

Operation and Maintenance expense, previously projected in Table 21, is shown on Line 6 of Table 24. Line 7 shows the estimated allowance for claims and bad debt expense which is assumed to be 1 percent of projected revenue. Projected Net Operating Revenue from system operations is shown on Line 8.

Lines 9 through 11 present debt service requirements on currently outstanding and proposed senior revenue bonds. Existing bonds include the Series 2011, Series 2014 and Series 2015 bonds. Line 10 reflects projected principal and interest payments on additional revenue bond debt financing of $158,000,000 in 2018 and $124,000,000 in 2020. Proposed debt is assumed to be 30 year, 5.5 percent fixed interest rate bonds issued in March, with equal annual payments of principal and interest.

In July of 2006, the Board entered into a Cooperative Endeavor Agreement with the State of Louisiana to secure proceeds from the State's Gulf Opportunity Tax Credit Bond Loan Program to assist in payment of debt service requirements from 2006 through 2008. The Board has borrowed $77,465,247 on this agreement. No principal or interest was payable during the initial five-year period of the loan, but after that period, the loan began to bear an interest rate of 4.64 percent. Payments for the sewerage portion of principal and interest began in July 2012 and are shown on Line 12 of Table 24 as subordinate debt.

Anticipated non-operating revenue is shown on Line 14.

Line 15 reflects the projected transfer of accumulated net earnings from system operations to assist in major capital financing. Typically, such accumulated net earnings may be used to help recover portions of the annual costs of system operations or to assist in major capital improvement financing. Line 16 reflects payment to the DPW as well as claimants.

The General Resolution requires an Operating Reserve Fund of 90 days of the previous year's operation and maintenance expense; however the SWBNO's Financial Management Policy requires an Operating Reserve Fund of not less than 180 days. Line 17 indicates the projected annual transfers available to meet this requirement throughout the study period. The General Resolution also sets forth the option to maintain a rate stabilization fund. The amount to be transferred to this fund, as well as the timing, is determined by the Executive Director. There are no transfers currently anticipated during the study period as shown on Line 18 of Table 24.

Line 19 indicates the estimated Net Annual Balance from operations remaining at the end of each year.

The balance of operating funds available at the beginning of year 2017, shown on Line 20, is comprised of the current cash assets and reflects a balance of $47,055,200. The End of Year Balance, which is exclusive of the operating reserve fund and rate stabilization fund, is shown on Line 21.

Lines 22 through 26 demonstrate that the Board is maintaining an operating reserve equal to at least 180 days of the previous year's operation and maintenance expense beginning in 2018.

As demonstrated in Tables 23 and 24, it is anticipated that current revenue sources will be adequate to readily finance both projected capital program requirements as currently scheduled and estimated future operation expenses of the Sewerage Department during the 2017-2021 study period examined herein, with the adopted 10 percent revenue increases in 2017 through 2020, and a 1 percent revenue increase in 2021.

Bond Coverage Requirements

An additional consideration in measuring the adequacy of revenues is the provision of sufficient debt service coverage to meet the bond covenant requirements for the issuance of parity revenue bonds. The General Resolution provides that rates shall be maintained at levels which are expected to yield net revenues (as defined in the resolution) equal to at least 125 percent of the annual principal and interest requirement for senior debt and 110 percent for senior and subordinate debt in each fiscal year. The SWBNO's Financial Management Policy requires coverage at a minimum of 150 percent for senior debt and 125 percent for senior and subordinate debt.

The calculation of net revenue is shown on Lines 1 through 9 of Table 25. The ability of the Sewerage Department revenues to meet revenue bond coverage requirements is shown on Lines 10 through 14. As shown on Lines 12 and 14, the indicated projected revenue and revenue increases will provide sufficient net revenue to meet coverage requirements during the study period.

The General Resolution further prescribes that additional parity revenue bonds may be issued if net revenue from a previous test year (any 12 consecutive months of the last 24 months) is equal to at least 125 percent of the maximum annual principal and interest requirement for senior debt and 110 percent for senior and subordinate debt. For purposes of the additional bonds test, net revenue may be adjusted to reflect any increases not in effect during the selected test year but have been approved by the Board, Board of Liquidation and City Council and will go into effect within the following five years.

The results of the additional bonds test are shown on Lines 15 through 21 of Table 25. Lines 19 and 21 of the table indicate that with the magnitude of the adopted annual revenue increases, required minimum levels of coverage are met in each year with indicated coverage levels ranging from 206 percent to 404 percent.

Table 14

Sewerage Department
Historical and Projected Billed Volumes
and Average Number of Customers (a)

Customer Class	Historical		Projected				
	2015	2016	2017	2018	2019	2020	2021
Single Family Residential (b)							
Customers	115,192	116,226	116,800	117,300	117,800	118,200	118,600
Sales (1,000,000 gal.)	5,919	5,899	5,722	5,692	5,665	5,635	5,608
Sales Per Customer (1,000 gal.)	51	51	49	49	48	48	47
Multifamily Residential							
Customers	4,639	4,647	4,600	4,600	4,600	4,600	4,600
Sales (1,000,000 gal.)	605	643	631	625	619	614	609
Sales Per Customer (1,000 gal.)	130	138	137	136	135	133	132
Commercial							
Customers	12,396	12,370	12,400	12,400	12,400	12,400	12,400
Sales (1,000,000 gal.)	2,918	3,414	3,303	3,272	3,242	3,214	3,188
Sales Per Customer (1,000 gal.)	235	275	266	263	261	259	257
Industrial							
Customers	37	34	34	34	34	34	34
Sales (1,000,000 gal.)	44	36	36	36	35	35	35
Sales Per Customer (1,000 gal.)	1,188	1,066	1,056	1,047	1,035	1,026	1,018
Total							
Customers	132,264	133,277	133,834	134,334	134,834	135,234	135,634
Sales (1,000,000 gal.)	9,485	9,992	9,692	9,624	9,561	9,498	9,440

(a) Excludes customers receiving free service.
(b) Includes duplex.

Table 15

Sewerage Department
Existing Sewer Rates
(Effective January 1, 2017)

Rate Components	General Service
	$
Monthly Sewerage Service Charge	
Meter Size Inches	
5/8	18.68
3/4	26.59
1	37.85
1-1/2	69.66
2	101.87
3	241.58
4	402.63
6	805.26
8	1,207.89
10	1,610.51
12	1,852.09
16	2,496.30
Monthly Quantity Charge	
Per 1,000 Gallons	6.50
Excessive Strength Charge per Pound	
BOD	0.43
SS	0.25

Table 16

Sewerage Department
Statement of Historical Revenue

Revenue Source	2012	2013	2014	2015	2016
	$	$	$	$	$
Operating Revenue					
Sewerage Service Charges	70,707,230	77,767,114	85,740,367	94,775,797	104,060,458
Delinquent Fee	700,605	768,670	812,895	861,169	734,725
Total Operating Revenue	71,407,835	78,535,785	86,553,262	95,636,965	104,795,182
Nonoperating Revenue					
Interest Income	194,080	178,122	257,824	1,340,586	2,301,168
Plumbing Inspection and License Fees	343,903	321,518	339,176	305,384	318,511
Revenue Sharing	154,509	274,229	317,506	322,674	313,048
Other Income (a)	296,406	771,397	1,289,474	560,157	505,847
Total Nonoperating Revenue	988,898	1,545,265	2,203,980	2,528,801	3,438,574
Total Revenue	72,396,734	80,081,050	88,757,242	98,165,766	108,233,756

(a) Includes $1,533,624 in operating and maintenance grants in 2011 , -$7,463 in 2012, -$5,367 in 2013 and -$383,354 in 2014.

Table 17

Sewerage Department
Historical Operation and Maintenance Expenses (a)

	2012	2013	2014	2015	2016
	$	$	$	$	$
Personal Services	24,403,860	24,785,716	23,301,162	30,903,283	27,619,358
Services & Utilities	17,225,768	17,463,783	18,342,982	17,148,698	20,269,282
Supplies & Materials	2,800,856	3,201,309	4,946,831	9,090,197	10,205,920
Special Current Charges	296,041	588,515	1,762,961	617,675	(56,248)
Furniture & Equipment	157,870	199,073	205,113	268,870	202,343
Repairs & Facility Maintenance	0	0	0	0	0
Total Operation and Maintenance	44,884,396	46,238,396	48,559,050	58,028,723	58,240,656

(a) Historical operation and maintenance expenses do not include the non-cash portion of provision for claims as recorded in the Comprehensive Annual Financial Report. Estimates of future Water Department claims payable are included in Table 24.

Table 18

Sewerage Department
Capital Expenditures
2016

C.P. #	Project	Actual Expenditures
		$
	Sewerage Systems	
313	Extensions & Replacements - Sewer Force Mains EPA Consent Decree	321,042
317	Normal Extensions & Replacement of Gravity Mains	10,126,432
318	Rehabilitation Gravity Sewer System	3,015,865
326	Extensions & Replacements to Sewer Pumping Stations	839,571
339	Mains in Street Dept. Contracts	(1,610,845)
340	Sewerage Hurricane Recovery Bonds (FEMA)	4,466,847
348	Normal Extensions & Replacements	8,511,325
368	Wetlands Assimilation Project	1,052,444
375	Sewerage Hurricane Recovery Bonds	1,324,030
380	FEMA Review of Change Orders-Sewer	1,356,523
	Total Sewerage System	29,403,235
	Power Projects and General Budget	
600	Sewerage Share of Power Projects	2,110,436
700	Sewer Reserve for Emergencies	63,521
800	Sewerage Share of General Budget Items	8,967,253
	Total Power Projects and General Budget	11,141,209
	Total Sewerage Department	40,544,444

Table 19

Sewerage Department
Projected Capital Improvements (a)

C.P. #	Project	2017	2018	2019	2020	2021	Total
		$	$	$	$	$	$
	Reinvestment in Assets						
317	Extensions and Replacements - Gravity Mains	22,200,000	29,000,000	25,700,000	23,700,000	23,700,000	124,300,000
318	Rehabilitation Gravity Sewer System	9,335,000	8,035,000	9,335,000	8,035,000	9,435,000	44,175,000
319	Extension and Replacements - Sanitary Sewer Mains Algiers	2,000,000	2,000,000	3,000,000	2,500,000	3,000,000	12,500,000
326	Extensions and Replacements to Pumping Stations	3,960,000	5,990,000	6,790,000	2,300,000	3,600,000	22,640,000
339	Mains in Streets Department Contracts	5,300,000	5,300,000	5,300,000	5,300,000	5,300,000	26,500,000
348	Extensions and Replacements - Treatment Plants	8,580,000	3,595,000	4,805,000	5,225,000	850,000	23,055,000
360	SELA Sewerage Relocation Costs	844,000	643,000	0	0	0	1,487,000
382	Paving Repair Contracts	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000	5,000,000
600	Sewer Share of Power Projects	29,467,230	5,013,970	99,000	2,196,000	490,000	37,266,200
702	Sewer Reserve for Emergencies	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	10,000,000
800	Sewer Share of General Budget Items	11,136,800	9,092,000	9,296,000	7,131,000	7,600,000	44,255,800
	Total Routine Annual Improvements	95,823,030	71,668,970	67,325,000	59,387,000	56,975,000	351,179,000
	Major Capital Improvements						
313	Extensions and Replacements - Sewer Force Mains	8,700,000	6,600,000	9,350,000	9,000,000	11,750,000	45,400,000
358	WWTP Normal Extensions & Replacements	0	0	10,000	0	0	10,000
368	Wetland Assimilation	4,300,000	300,000	0	0	0	4,600,000
375	Sewerage Hurricane Recovery Bonds	9,110,000	5,850,000	4,250,000	6,000,000	3,670,000	28,880,000
381	Modification and Expansion of WBSTP to 20/50 MGD	1,305,000	1,590,000	2,935,000	210,000	0	6,040,000
383	Sewerage Hurricane Recovery Bonds (Non FEMA)	2,000,000	0	0	0	0	2,000,000
	Total Major Improvements	25,415,000	14,340,000	16,545,000	15,210,000	15,420,000	86,930,000
	Total Sewerage System Improvements	121,238,030	86,008,970	83,870,000	74,597,000	72,395,000	438,109,000

(a) The improvements for 2017-2021 are based on the amended 2017 capital budget and 2017-2026 capital improvement program.

Table 20

Sewerage Department
Projected Operating Revenue

	(1)	(2)	(3)
Year	Revenue From Charges	Additional Revenue (a)	Total Service Charge Revenue
	$	$	$
2017	110,429,700	0	110,429,700
2018	110,204,900	10,863,100	121,068,000
2019	110,031,900	22,725,200	132,757,100
2020	109,833,100	35,674,100	145,507,200
2021	109,557,400	36,717,300	146,274,700

(a) Reflects additional revenue from adopted revenue increases.

Table 21

Sewerage Department
Projected Operation and Maintenance Expenses

	2017 (a)	2018	2019	2020	2021
	$	$	$	$	$
Personal Services	35,409,700	36,472,000	37,566,200	38,693,100	39,853,900
Services & Utilities	25,986,500	26,766,100	27,569,100	28,396,200	29,248,000
Supplies & Materials	13,084,600	13,477,100	13,881,500	14,297,900	14,726,800
Special Current Charges	(72,100)	(74,300)	(76,500)	(78,800)	(81,100)
Furniture & Equipment	259,400	267,200	275,200	283,500	292,000
Repairs & Facility Maintenance	0	0	0	0	0
Total Operation and Maintenance	74,668,100	76,908,100	79,215,500	81,591,900	84,039,600

(a) Represents the amended operating budget approved on September 20, 2017.

Table 22

Sewerage Department
Debt Service Requirements

Debt Issue	Amount of Issue	2017	2018	2019	2020	2021
	$	$	$	$	$	$
Existing Bonds						
Series 2014		19,309,800	17,642,500	16,217,500	16,234,100	13,106,300
Series 2015		5,000,000	5,000,000	5,000,000	5,000,000	6,950,000
Series 2011 (LADEQ)		496,700	496,600	496,500	496,400	496,200
Total Existing Debt Service		24,806,500	23,139,100	21,714,000	21,730,500	20,552,500
Projected Bonds						
2017	0	0	0	0	0	0
2018	158,000,000		9,059,417	10,871,300	10,871,300	10,871,300
2019	0			0	0	0
2020	124,000,000				7,109,917	8,531,900
2021	0					0
Total Projected Debt Service		0	9,059,417	10,871,300	17,981,217	19,403,200
Total Debt Service		24,806,500	32,198,517	32,585,300	39,711,717	39,955,700

Table 23

Sewerage Department
Capital Improvement Program Financing

Line No.	Description	Fiscal Year Ending December 31,					
		2017	2018	2019	2020	2021	Total
		$	$	$	$	$	$
1	Funds Available at Beginning of Year	151,780,100	350,300	76,729,400	10,261,200	67,525,000	151,780,100
2	Revenue Bond Proceeds	0	158,000,000	0	124,000,000	0	282,000,000
3	Operation Fund Transfers	17,000,000	5,000,000	15,000,000	18,000,000	18,000,000	73,000,000
4	Participation by Others	0	14,329,000	7,072,000	6,399,000	5,679,000	33,479,000
5	Interest Income	765,500	880,600	437,500	770,900	390,500	3,245,000
6	Total Funds Available	169,545,600	178,559,900	99,238,900	159,431,100	91,594,500	543,504,100
7	Obligated Contracts & Capital Jobs	(47,957,300)	0	0	0	0	(47,957,300)
8	Major Capital Additions	(121,238,000)	(88,589,200)	(88,977,700)	(81,514,200)	(81,481,200)	(461,800,300)
9	Bond Issuance Expense	0	(2,370,000)	0	(1,860,000)	0	(4,230,000)
10	Revenue Bond Reserve Fund	0	(10,871,300)	0	(8,531,900)	0	(19,403,200)
11	Total Application of Funds	(169,195,300)	(101,830,500)	(88,977,700)	(91,906,100)	(81,481,200)	(533,390,800)
12	End of Year Balance	350,300	76,729,400	10,261,200	67,525,000	10,113,300	10,113,300

Table 24

Sewerage Department
Analysis of Ability of Forecasted Revenue to Finance Projected Revenue Requirements

Line No.	Description	Fiscal Year Ending December 31, 2017	2018	2019	2020	2021
		$	$	$	$	$
1	Revenue from Charges	110,429,700	110,204,900	110,031,900	109,833,100	109,557,400
2	Total Additional Revenue (a)	0	10,863,100	22,725,200	35,674,100	38,058,200
3	Total Service Charge Revenue	110,429,700	121,068,000	132,757,100	145,507,200	147,615,600
4	Other Operating Revenue	4,152,300	4,148,600	4,202,300	4,257,400	4,310,000
5	Total Operating Revenue	114,582,000	125,216,600	136,959,400	149,764,600	151,925,600
6	Operation & Maintenance	(74,668,100)	(76,908,100)	(79,215,500)	(81,591,900)	(84,039,600)
7	Non-Cash Expense Accruals	(2,361,100)	(2,512,500)	(2,676,500)	(2,853,300)	(2,914,100)
8	Net Operating Revenue	37,552,800	45,796,000	55,067,400	65,319,400	64,971,900
	Debt Service					
	Senior Lien Revenue Bonds					
9	Existing	(24,806,500)	(23,139,100)	(21,714,000)	(21,730,500)	(20,552,500)
10	Projected	0	(9,059,400)	(10,871,300)	(17,981,200)	(19,403,200)
11	Subtotal	(24,806,500)	(32,198,500)	(32,585,300)	(39,711,700)	(39,955,700)
	Subordinate Revenue Bonds					
12	Gulf Opportunity Zone Act Loan	(6,235,200)	(6,235,200)	(6,235,200)	(6,235,200)	(6,235,200)
13	Total Debt Service	(31,041,700)	(38,433,700)	(38,820,500)	(45,946,900)	(46,190,900)
14	Other Non-Operating Revenue	462,100	462,100	462,100	462,100	462,100
15	Transfer to Construction	(17,000,000)	(5,000,000)	(15,000,000)	(18,000,000)	(18,000,000)
16	Due from/(to) Other Departments	(486,000)	0	0	0	0
17	Transfer to Operating Reserve Fund	0	(4,050,600)	(552,300)	(568,900)	(586,000)
18	Transfer from/(to) Rate Stabilization Fund	0	0	0	0	0
19	Net Annual Balance	(10,512,800)	(1,226,200)	1,156,700	1,265,700	657,100
20	Beginning of Year Cash Balance (b)	47,055,200	36,542,400	35,316,200	36,472,900	37,738,600
21	End of Year Balance	36,542,400	35,316,200	36,472,900	37,738,600	38,395,700
22	Beginning of Year Cash Balance (b)	47,055,200	36,542,400	39,366,800	41,075,800	42,910,400
23	Operating Reserve Fund	0	4,050,600	552,300	568,900	586,000
24	Net annual Balance	(10,512,800)	(1,226,200)	1,156,700	1,265,700	657,100
25	End of Year Balance	36,542,400	39,366,800	41,075,800	42,910,400	44,153,500
26	Days of O&M Cash on Hand	173	181	183	185	185

(a) Reflects revenue from an eight-year series of annual 10% rate increases effective January 1, 2013; adopted by the City Council in 2012 and a proposed 1% annual increase in 2021.

(b) Reflects beginning of year balance in unrestricted and undesignated cash and cash equivalents and cash and cash equivalents designated for capital projects, less operating reserve requirement.

Table 25

Sewerage Department
Coverage Requirements

Line No.	Coverage Requirements	2017	2018	2019	2020	2021
		$	$	$	$	$
	Projected Net Revenues					
1	Revenue Under Existing Rates	110,429,700	121,068,000	132,757,100	145,507,200	147,615,600
2	Additional Revenue Under Proposed Rates	0	10,863,100	22,725,200	35,674,100	38,058,200
3	Interest Income	1,799,400	1,910,800	1,521,400	1,909,900	1,582,100
4	Plumbing and Inspection Fees	326,100	326,100	326,100	326,100	326,100
5	Other Miscellaneous Revenue	597,300	597,300	597,300	597,300	597,300
6	Operation & Maintenance Grants	2,195,000	2,195,000	2,195,000	2,195,000	2,195,000
7	Transfer from Rate Stabilization Fund	0	0	0	0	0
8	Operation & Maintenance	(74,668,100)	(76,908,100)	(79,215,500)	(81,591,900)	(84,039,600)
9	Net Revenue	40,679,400	60,052,200	80,906,600	104,617,700	106,334,700
	Rate Covenant Coverage					
10	Projected Net Revenues	40,679,400	60,052,200	80,906,600	104,617,700	106,334,700
	Annual Debt Service					
11	Senior Debt	24,806,500	32,198,500	32,585,300	39,711,700	39,955,700
12	Coverage (a)	164%	187%	248%	263%	266%
13	All Debt	31,041,700	38,433,700	38,820,500	45,946,900	46,190,900
14	Coverage (b)	131%	156%	208%	228%	230%
	Additional Bond Coverage					
15	Preceding Year Projected Net Revenues	49,993,000	40,679,400	60,052,200	80,906,600	104,617,700
16	Future Additional Revenue	50,169,800	39,506,600	27,183,600	15,917,700	4,459,700
17	Adjusted Projected Net Revenues	100,162,800	80,186,000	87,235,800	96,824,300	109,077,400
	Maximum Debt Service					
18	Senior Debt	24,806,500	32,601,800	32,601,800	39,955,700	39,955,700
19	Coverage (a)	404%	246%	268%	242%	273%
20	All Debt	31,041,700	38,837,000	38,837,000	46,190,900	46,190,900
21	Coverage (b)	323%	206%	225%	210%	236%

(a) The General Bond Resolution requires net revenue to equal or exceed 125% of debt service.
(b) The General Bond Resolution requires net revenue to equal or exceed 110% of debt service.

Drainage Department

2016 DRAINAGE DEPARTMENT OPERATIONS

The Sewerage and Water Board has provided for the drainage needs of New Orleans since 1903. The City encompasses a saucer-shaped depression between the Mississippi River and Lake Pontchartrain on the East Bank and an area bordered by the river and adjoining wet lands on the West Bank. Prior to January 1, 1967, when the three-mill drainage tax became effective, the City of New Orleans was obligated to reimburse the Board for the cost of operating and maintaining drainage facilities.

In 1969, studies of projected capital improvement financing needs and revenue requirements indicated the need for additional sources of funds. Constitutional amendments, which would have provided the required funds from an additional three-mill ad valorem tax, were offered in 1970, and again in 1972. The State's electorate rejected both amendments; however, an additional six-mill ad valorem tax was approved April 16, 1977 and became effective January 1, 1978. Subsequently, a nine-mill property tax increase was approved May 16, 1981 and implemented January 1, 1982. The nine-mill tax, which is to be used for operation and maintenance as well as funding of capital improvements, was reauthorized in December 2016.

The Board is charged with operating, maintaining, repairing, and expanding the major drainage system located throughout the City.

Revenues

Revenues that were available to the Drainage Department for operation and maintenance expenses, and capital additions, consisted of proceeds from the three-mill, six-mill, and nine-mill ad valorem tax, interest on investments, and miscellaneous income. Other revenues available for Drainage Department capital improvements included interest income and other miscellaneous sources.

A summary of historical revenues received by source is shown in Table 26 for the period 2012 through 2016. The historical revenue shown in Table 26 was developed from detailed records provided by Board Staff.

Operation and Maintenance Expenses

Table 27 presents a summary of 2012 through 2016 operation and maintenance expenses of the Drainage Department. Expenditures for 2016 decreased about 11.4% percent over 2015 expenditures. Historical operation and maintenance expenses shown in Table 27 do not include the non-cash portion of Provision for Claims as recorded in the Comprehensive Annual Financial Report. Estimate of future Drainage Department claims are included on Line 5 in Table 35.

Capital Budget and Expenditures

Capital expenditures of the Drainage Department include the cost of replacements and improvements to pumping stations and canals and the Drainage Department's pro rata share of power projects and general budget costs.

The Drainage Department capital improvement expenditures for 2016 totaled $39,267,762. The Drainage Department's capital improvement expenditures for the year are shown in Table 28.

Summary of Operations

The following tabulation shows a summary of receipts and expenditures of the Drainage Department during 2016:

Total Revenues	$57,349,315
Operation and Maintenance Expense	33,523,624
Claims	2,223,009
Debt Service Payments	2,017,050
Revenue Primarily Available for Capital Expenditures [a]	**19,585,632**

[a] Excludes depreciation.

PROPOSED CAPITAL IMPROVEMENT PROGRAM

Table 29 presents a summary of the projected major capital improvement program for the period 2017 through 2021. Table 29 is based on the Board's amended 2017 Capital Budget and 2017-2016 Capital Improvement Program. The five-year major capital improvement program costs are expected to total $437,343,100. About 46 percent of this amount, or $235,361,700, is for recurring annual capital improvements, with the remaining $201,981,400 for major improvements. The proposed routine annual capital expenditures for drainage system improvements and extensions include $94,179,300 for the Drainage Department's share of power projects, and $46,093,000 for its share of general budget items.

Participation by others consists of monies collected from developers and individuals for the extension of drainage service to new customers and from governmental agencies for replacement and expansion of system facilities. As shown in Table 30, future revenues from these sources are estimated by the Board in the 2017 through 2026 Capital Improvement Program according to capital project and amount to $329,121,000, most of which is provided by the COE.

The Sewerage and Water Board is currently receiving funds from the COE sponsored and congressionally authorized SELA Project. This funding will allow additional construction of projects which were identified in the 1970s, but which have not been completed because of funding limitations. The identified projects are to be funded either 100 percent from federal funds or 65 percent from federal funds and 35 percent from local funds. The payback period for the local share is 30 years and is anticipated to begin in 2020.

ABILITY TO FINANCE PROPOSED CAPITAL EXPENDITURES

Drainage Department future operating and capital cost requirements are to be met by the revenue sources previously discussed. In 2015, the three-mill, six-mill, and nine-mill ad valorem taxes were the principal source of operating funds for the Drainage Department.

Revenues

Projected operating income of the drainage system is shown in Table 31. Projections include proceeds from the three-mill, the six-mill, and the nine-mill ad valorem tax and other revenue and are based on the 2016 assessed taxable value. It is assumed that the projected revenue from the ad valorem taxes will remain constant during the study period due to the roll-back provisions of Louisiana state law.

Other sources of income include interest earned from the investment of funds held for future use; sales of three-mill, six-mill, and nine-mill ad valorem tax bonds; and participation by others. Projections of interest income, which vary according to the balance of funds held for future use, are shown in a later section of this report.

The projection of millage revenue for 2017 through 2021 is based on 4.66, 4.71, and 7.06 mills for three-mill, six-mill, and nine-mill taxes, respectively.

Operation and Maintenance Expenses

A summary of projected operation and maintenance expenses for the period 2017 through 2021 is shown in Table 32. Estimates of future expenses are based on anticipated future operating conditions and allowances for inflationary factors.

Projections of future operating and maintenance expenses for the study period are based on the Board's amended 2017 Operating Budget and an analysis of the current and anticipated operating conditions and trends.

Debt Service Requirements

Future debt service requirements of the Drainage Department are made up of principal, interest, and reserve fund payments for currently outstanding and future drainage revenue bond issues. As of December 31, 2016, outstanding debt obligations consisted of $11,100,000 of Drainage Revenue Bonds, Series 2014.

It is assumed that no future debt will be issued during the 2017 – 2021 study period.

The Drainage Department has borrowed from the DPW. It is anticipated that this amount will be reimbursed during the study period.

Adequacy of Revenues to Finance Proposed Capital Improvements

Total revenue requirements for the Drainage Department recognized for purposes of this report include operation and maintenance expense, allowance for claims, debt service costs on major capital improvements financed through the sale of bonds, and expenditures for capital improvements not financed from bond proceeds. Table 34 examines the financing of the major capital improvement program and Table 35 summarizes the financing of operation and maintenance expense, debt service costs on outstanding and proposed bonds, and the transfer of operating funds for major capital improvement financing.

Capital Projects Funding

Table 34 presents the major capital improvement financing plan which summarizes the projected source and application of funds over the five-year study period. The amount of Funds Available at Beginning of Year, shown on Line 1, is $42,299,000. This amount is based on audited data provided by the Board.

Projected revenue bond proceeds are shown on Line 2; however, it is projected that the Board will not have the capacity to issue additional bonds during the study period. In addition, it is anticipated that the Board will not have the capacity to finance the major capital improvement program with operating revenue as shown on Line 3.

Other sources of funds available to meet major capital improvement expenditures are Participation by Others and interest income. Participation by Others, as shown on Line 4 includes anticipated funding by the COE and FEMA as well as others. Interest earnings recognize an assumed 1.0 percent average annual interest rate and are shown on Line 5. Line 6 of the table shows the projected major capital improvement funds available each year.

As of December 31, 2016, the Board had $15,209,300 obligated for open contracts and capital jobs as shown on Line 7 of Table 34. Line 8 show the projected Major Capital Additions to be funded as shown in Table 29. Due to constraints on revenue, it is anticipated that a portion of the capital projects in 2021 will need to be deferred until an additional revenue source has been identified. This deferral is shown on Line 9.

The Total Application of Funds is shown on Line 12 of Table 34. The net End of Year Balance is shown on Line 13.

Operating Fund

Money deposited in the Drainage System Fund is obtained primarily from the three-mill, six-mill, and nine-mill ad valorem tax as shown on Line 1 of Table 35.

Other revenue available for system operations is shown on Line 2. Miscellaneous revenue includes rental income, gain or loss on the sale of assets and other miscellaneous income. Interest Income available to the operating fund which is included in Line 2, is estimated to be 1.0 percent of the average of the beginning and end of year Net Annual Balance, except as the average is affected by identifiable nonrecurring major receipts, transfers, or expenditures during the year. Interest from the Bond Reserve Fund, also included in Line 2, is estimated to be 1.0 percent. Total Operating Revenue is shown on Line 3 of Table 35.

Operation and Maintenance expense, previously projected in Table 32, is shown on Line 4 of Table 35. Line 5 includes the estimated allowance for claims and bad debt expense which is assumed to be 0.5 percent of projected revenue. Projected Net Operating Revenue from system operations is shown on Line 6.

Lines 7 through 9 present debt service requirements on currently outstanding and proposed senior revenue bonds. Existing debt includes the Series 2014 bonds. As previously mentioned, it is projected that the Board will not have the capacity to issue additional bonds during the study period.

In July of 2006 the Board entered into a Cooperative Endeavor Agreement with the State of Louisiana to secure proceeds from the State's Gulf Opportunity Tax Credit Bond Loan Program to assist in payment of debt service requirements from 2006 through 2008. The Board has borrowed $77,465,247 on this agreement. No principal or interest was payable during the initial five-year period of the loan, but after that period, the loan began to bear an interest rate of 4.64 percent. Payments for the drainage portion of principal and interest began in July 2012 and are shown on Line 10 of Table 35.

Line 11 reflects the estimated SELA repayments that will begin in 2020. Total debt service is shown on Line 12.

Anticipated non-operating revenue is shown on Line 13.

Line 14 reflects the projected transfer of accumulated net earnings from system operations to assist in major capital financing. Typically, such accumulated net earnings may be used to help recover portions of the annual costs of system operations or to assist in major capital improvement financing. Line 15 reflects repayment from the Water Department and repayment to the DPW as well as repayment to claimants.

The General Resolution requires an Operating Reserve Fund of 90 days of the previous year's operation and maintenance expense; however the SWBNO's Financial Management Policy requires an Operating Reserve Fund of not less than 180 days. Line 16 indicates the projected annual transfers available to meet this requirement throughout the study period.

Line 17 indicated the estimated Net Annual Balance from operations remaining at the end of each year.

The balance of operating funds available at the beginning of the year 2017, shown on Line 18, is comprised of current cash assets and reflects a balance of $18,661,200. The End of Year Balance, which is exclusive of the operating reserve fund, is shown on Line 19 and drops to a deficit of $5,172,300 by 2021 which indicates that the existing source of revenue for the Drainage Department will not be sufficient to fund operation and maintenance expense and required debt service payments by 2021.

Lines 20 through 24 demonstrate that the Board is maintaining an operating reserve equal to at least 180 days of the previous year's operation and maintenance expense through 2019; however the balance drops to -8 days by 2021.

Bond Coverage Requirements

A requirement of the Drainage Bond Resolution provides that revenues derived from the nine-mill ad valorem tax should provide an amount sufficient to provide for the interest and principle payment on the Series 2014 bonds. As shown on Line 25 of Table 35 the projected revenue from the nine-mill ad valorem tax will provide sufficient revenue to meet coverage requirements on existing debt during the study period.

The Drainage Bond Resolution also provides that additional parity bonds may be issued, but only after certain conditions have been met. One condition is that the revenues derived from the nine-mill ad valorem tax for the most recently completed calendar year prior to the year of issuance are equal to at least one and one-third (1-1/3) times the maximum debt service on all bonds outstanding and the additional bonds.

Due to the constraints to meet operation and maintenance expense and required debt service payments on existing debt during the study period, the Drainage Department does not have the revenue capacity to issue additional debt. In addition, the revenue from the nine-mill ad valorem tax does not provide the debt capacity needed to fund the five-year capital improvement program; therefore a portion of capital improvements must be deferred as previously mentioned. Therefore, in order to completely fund the five-year capital program, an alternative funding source would need to be identified for the Drainage Department.

Black & Veatch suggests that when a new funding source is identified, the Board work with its bond counsel and financial advisor to refund all outstanding debt at that time and issue new debt reflecting a general bond resolution that includes the new funding source and all other revenue in the coverage calculation and reflects covenants more consistent with the 2014 water and sewerage resolutions. It is anticipated that the Board will have the capacity to debt finance more projects under the new resolution.

Table 26

Drainage Department
Statement of Historical Revenue

Revenue Source	2012	2013	2014	2015	2016
	$	$	$	$	$
Three-mill Ad Valorem Tax	12,497,723	13,175,711	13,481,526	14,139,193	16,043,825
Six-mill Ad Valorem Tax	12,630,977	13,317,505	13,626,539	14,290,667	16,215,799
Nine-mill Ad Valorem Tax	18,933,290	19,962,114	20,425,388	21,421,102	23,762,398
Two-mill Ad Valorem Tax	0	0	0	0	7,526
Interest Earned	109,748	92,615	203,832	202,579	253,938
Other	1,103,330	1,099,908	1,277,250	4,313,845	1,065,829
Total Revenue	45,275,067	47,647,853	49,014,535	54,367,386	57,349,315

Table 27

Drainage Department
Historical Operation and Maintenance Expenses (a)

	2012	2013	2014	2015	2016
	$	$	$	$	$
Personal Services	18,544,593	18,836,845	17,096,914	25,494,930	21,132,530
Services & Utilities	11,165,440	11,258,057	11,460,611	10,324,968	10,240,962
Supplies & Materials	1,909,601	1,937,679	1,523,346	1,511,946	1,682,711
Special Current Charges	800,572	578,960	756,295	372,914	364,893
Furniture & Equipment	66,823	91,674	62,057	109,745	102,528
Repairs & Facility Maintenance	0	0	0	0	0
Total Operation and Maintenance	32,487,029	32,703,215	30,899,222	37,814,502	33,523,624

(a) Historical operation and maintenance expenses do not include the non-cash portion of provision for claims as recorded in the Comprehensive Annual Financial Report. Estimates of future Water Department claims payable are included in Table 35.

Table 28

Drainage Department
Capital Expenditures
2016

C.P. #	Project	Actual Expenditures
		$
	Canals	
418	Normal Extensions & Replacements	44,887
439	Major Drainage Participation in DPW Projects	131,945
466	Louisiana Avenue Canal (SELA)	13,067,979
471	SELA Program Management	2,460,361
476	Hollygrove Canals (SELA-A)	10,972
478	S. Claiborne-Lowerline to Monticello Street	297,717
480	FEMA Review of Change Orders-Drainage	2,606,076
486	Napoleon Canal Improvements (SELA-B)	123,632
497	Florida Ave. Canad - DPS#19 to Peoples Ave. (SELA-B)	921,077
498	Dwyer Intake Canal (St. Charles to Dwyer DPS) (SELA-A)	50,952
499	Jefferson Avenue Canal	557,141
	Total Drainage Canals	20,272,739
	Pumping Stations	
511	Normal Extensions & Rep./Stations	225,489
574	Hurricane Katrina Expenses for Drainage System	0
575	Drainage Hurricane Recovery Bonds	1,044,941
	Total Drainage Pumping Stations	1,270,430
	Power Projects and General Budget	
600	Drainage Share of Power Projects	9,673,519
703	Drainage Reserve for Emergency	1,097,286
800	Drainage Share of General Budget Items	6,953,788
	Total Power Projects and General Budget	17,724,593
	Total Drainage Department	39,267,762

Table 29

Drainage Department
Projected Capital Improvements (a)

C.P.#	Project	2017	2018	2019	2020	2021	Total
		$	$	$	$	$	$
	Reinvestment in Assets						
418	Normal Ext. & Replacements	730,000	730,000	730,000	730,000	730,000	3,650,000
511	Normal Ext. & Replacement - Stations	15,700,000	13,310,000	17,686,000	20,103,400	14,640,000	81,439,400
600	Drainage Share of Power Projects	37,027,700	16,066,000	14,418,000	14,237,600	12,430,000	94,179,300
703	Drainage Reserve for Emergencies	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	10,000,000
800	Drainage Share of General Budget Items	16,481,000	8,357,000	7,784,000	6,506,000	6,965,000	46,093,000
	Total Routine Capital Improvements	71,938,700	40,463,000	42,618,000	43,577,000	36,765,000	235,361,700
	Major Capital Improvements						
439	Mains, Over 36" in Street Dept. Contracts	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	10,000,000
453	Improvements to Metairie Relief Canal	5,500,000	0	0	0	0	5,500,000
466	Louisiana Ave. Canal	250,000	500,000	500,000	0	0	1,250,000
471	SELA Program Management	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	7,500,000
478	S. Claib - Lowerline to Monticello St.	575,000	500,000	0	0	0	1,075,000
483	Airline & Monticello Canal Improvements	0	0	50,000	228,000	22,800,000	23,078,000
486	Napoleon Avenue Canal Improvements	300,000	250,000	0	0	0	550,000
492	Donner Canal Improvements	250,000	2,500,000	2,500,000	0	75,000,000	80,250,000
496	General De Gaulle Canal	0	35,000,000	3,375,000	0	0	38,375,000
497	Florida Avenue Canal - DPS #19 to Peoples	910,000	300,000	0	0	0	1,210,000
498	Dwyer Intake Canal	25,000	0	0	0	0	25,000
499	Jefferson Avenue Canal	530,000	515,000	0	0	0	1,045,000
512	Expansion of DPS #15	0	0	1,200,000	14,500,000	0	15,700,000
535	DPS #6	5,151,400	264,000	264,000	1,504,000	0	7,183,400
573	DPS #13 Improvements	0	0	0	440,000	7,000,000	7,440,000
575	Drainage Hurricane Recovery Bonds	1,600,000	0	0	0	0	1,600,000
576	COE Storm Proofing Projects						0
578	Permanent Pump Stations at the Laek Elaine DPS Repairs	0	0	200,000	0	0	200,000
	Total Major Capital Improvements	18,591,400	43,329,000	11,589,000	20,172,000	108,300,000	201,981,400
	Total Drainage Department Improvements	90,530,100	83,792,000	54,207,000	63,749,000	145,065,000	437,343,100

(a) The improvements for 2017-2021 are based on the amended 2017 capital budget and 2017-2026 capital improvement program.

Table 30

Drainage Department
Projected Participation by Others (a)

C.P.#	Project	2017	2018	2019	2020	2021	Total
		$	$	$	$	$	$
418	Normal Extensions& Replacements	230,000	230,000	230,000	230,000	230,000	1,150,000
483	Airline & Monticello Canal Improvements	948,000	30,000,000	500,000			31,448,000
492	Donner Canal Improvements			112,788,000			112,788,000
496	General De Gaulle Canal	70,000,000	70,000,000				140,000,000
511	Normal Ext. & Replacement -DPS	13,457,000					13,457,000
535	DPS #6		160,000	320,000	320,000		800,000
676	Modifications to Power Generating System HMGP	29,478,000					29,478,000
	Total	114,113,000	100,390,000	113,838,000	550,000	230,000	329,121,000

(a) The improvements for 2017-2021 are based on the amended 2017 capital budget and 2017-2026 capital improvement program.

Table 31

Drainage Department
Projected Operating Revenue

Year	Ad Valorem Tax Revenue			Other	Total
	Three-Mill	Six-Mill	Nine-Mill		
	$	$	$	$	$
2017	15,331,200	15,496,200	23,125,700	1,600,000	55,553,100
2018	15,331,200	15,496,200	23,125,700	1,616,000	55,569,100
2019	15,331,200	15,496,200	23,125,700	1,632,000	55,585,100
2020	15,331,200	15,496,200	23,125,700	1,648,000	55,601,100
2021	15,331,200	15,496,200	23,125,700	1,664,000	55,617,100

Table 32

Drainage Department
Projected Operation and Maintenance Expenses

	2017 (a)	2018	2019	2020	2021
	$	$	$	$	$
Personal Services	27,615,700	28,444,200	29,297,500	30,176,400	31,081,700
Services & Utilities	13,382,700	13,784,200	14,197,700	14,623,600	15,062,300
Supplies & Materials	2,198,900	2,264,900	2,332,800	2,402,800	2,474,900
Special Current Charges	476,800	491,100	505,800	521,000	536,600
Furniture & Equipment	134,000	138,000	142,200	146,400	150,800
Repairs & Facility Maintenance	0	0	0	0	0
Total Operation and Maintenance	43,808,100	45,122,400	46,476,000	47,870,200	49,306,300

(a) Represents the amended operating budget approved on September 20, 2017.

Table 33

Drainage Department
Debt Service Requirements

Debt Issue	Amount of Issue	2017	2018	2019	2020	2021
	$	$	$	$	$	$
Nine-Mill Tax Bonds						
Series 2014		2,024,100	2,063,400	2,069,200	2,066,200	2,062,100
Total Nine-Mill Debt Service		2,024,100	2,063,400	2,069,200	2,066,200	2,062,100
Projected Bonds						
2017	0	0	0	0	0	0
2018	0		0	0	0	0
2019	0			0	0	0
2020	0				0	0
2021	0					0
Total Projected Debt Service		0	0	0	0	0
Total Debt Service		2,024,100	2,063,400	2,069,200	2,066,200	2,062,100

Table 34

Drainage Department
Capital Improvement Program Financing

Line No	Description	Fiscal Year Ending December 31,					
		2017	2018	2019	2020	2021	Total
		$	$	$	$	$	$
1	Funds Available at Beginning of Year	42,299,000	51,141,800	68,840,300	131,264,800	67,167,200	42,299,000
2	Revenue Bond Proceeds	0	0	0	0	0	0
3	Operation Fund Transfers	0	0	0	0	0	0
4	Participation by Others	114,113,000	103,401,700	117,253,100	566,500	236,900	335,571,200
5	Interest Income	469,200	602,600	1,004,600	997,400	339,000	3,412,800
6	Total Funds Available	156,881,200	155,146,100	187,098,000	132,828,700	67,743,100	381,283,000
7	Obligated Contracts & Capital Jobs	(15,209,300)	0	0	0	0	(15,209,300)
8	Major Capital Additions	(90,530,100)	(86,305,800)	(55,833,200)	(65,661,500)	(149,417,000)	(447,747,600)
9	Deferred Capital Improvements	0	0	0	0	81,900,000	81,900,000
10	Bond Issuance Expense	0	0	0	0	0	0
11	Revenue Bond Reserve Fund	0	0	0	0	0	0
12	Total Application of Funds	(105,739,400)	(86,305,800)	(55,833,200)	(65,661,500)	(67,517,000)	(381,056,900)
13	End of Year Balance	51,141,800	68,840,300	131,264,800	67,167,200	226,100	226,100

Table 35

Drainage Department
Analysis of Ability of Forecasted Revenue to Finance Projected Revenue Requirements

Line No	Description	Fiscal Year Ending December 31, 2017	2018	2019	2020	2021
		$	$	$	$	$
1	Tax Revenue	53,953,100	53,953,100	53,953,100	53,953,100	53,953,100
2	Other Revenue	1,831,900	1,887,000	1,883,400	1,829,400	1,708,100
3	Total Operating Revenue	55,785,000	55,840,100	55,836,500	55,782,500	55,661,200
4	Operation & Maintenance	(43,808,100)	(50,722,400)	(55,572,000)	(57,495,100)	(59,331,200)
5	Non-Cash Expense Accruals	(2,047,200)	(2,100,500)	(2,155,400)	(2,212,000)	(2,270,300)
6	Net Operating Revenue	9,929,700	3,017,200	(1,890,900)	(3,924,600)	(5,940,300)
	Debt Service					
	Senior Lien Revenue Bonds					
7	Existing	(2,024,100)	(2,028,400)	(2,028,600)	(2,036,000)	(2,039,100)
8	Projected	0	0	0	0	0
9	Subtotal	(2,024,100)	(2,028,400)	(2,028,600)	(2,036,000)	(2,039,100)
10	Gulf Opportunity Zone Act Loan	(407,600)	(407,600)	(407,600)	(407,600)	(407,600)
11	SELA Capital Repayment	0	0	0	(3,800,000)	(10,000,000)
12	Total Debt Service	(2,431,700)	(2,436,000)	(2,436,200)	(6,243,600)	(12,446,700)
13	Other Non-Operating Revenue	969,200	969,200	969,200	969,200	969,200
14	Transfer to Construction	0	0	0	0	0
15	Due from (to) Other Departments	(921,000)	0	0	0	0
16	Transfer to Operating Reserve Fund	0	(1,268,000)	(852,400)	(597,900)	(237,100)
17	Net Annual Balance	7,546,200	282,400	(4,210,300)	(9,796,900)	(17,654,900)
18	Beginning of Year Cash Balance (a)	18,661,200	26,207,400	26,489,800	22,279,500	12,482,600
19	End of Year Balance	26,207,400	26,489,800	22,279,500	12,482,600	(5,172,300)
20	Beginning of Year Cash Balance	18,661,200	30,340,400	30,622,800	26,412,500	16,615,600
21	Operating Reserve Fund	4,133,000	0	0	0	0
22	Net annual Balance	7,546,200	282,400	(4,210,300)	(9,796,900)	(17,654,900)
23	End of Year Balance	30,340,400	30,622,800	26,412,500	16,615,600	(1,039,300)
24	Days of O&M Cash on Hand	253	248	207	127	(8)
	Debt Service Coverage					
	Reflecting All Ad Valorem Tax Revenue					
25	Annual Test	1142.5%	1140.1%	1140.0%	1135.8%	1134.1%

(a) Reflects beginning of year balance in unrestricted and undesignated cash and cash equivalents and cash and cash equivalents designated for capital projects, less operating reserve requirement.

Appendix

Assessment of East Bank Sewage Stations

	DATE	FACILITY NAME	ROUTE	LOCATION	STATUS
1	06/06/16	Chickasaw	A	Chickasaw at Metropolitan	2 pumps total; 1 operational.
2	06/06/16	K-Mart	A	Desire at Gentilly	2 pumps total; both operational.
3	06/06/16	Station 23	A	4500 Mithra	3 pumps total, 1 portable pump outside; 2 operational, Pump 1 out of service.
4	06/06/16	Station 17	A	4975 Spain at Selma	2 pumps total; both operational.
5	06/06/16	Station 22	A	5705 Perlita	2 pumps total; both operational.
6	06/06/16	Station 19	A	3730 Jumonville at Milton	2 pumps total; both operational.
7	06/06/16	Station 21	A	6670 Memphis At Filmore	2 pumps total; both operational.
8	06/06/16	Station 18	A	Vicksburg at Florida	2 pumps total; both operational.
9	06/06/16	City Park	A	5701 Marconi Drive	2 pumps total; both operational.
10	06/07/16	Station 20	A	328 37th Street	2 pumps total; both operational.
11	06/07/16	Station 4	A	5899 Fleur de Leis	2 pumps total; both operational.
12	06/07/16	Lakewood South	A	Country Club Drive near Marconi	2 pumps total; both operational.
13	06/07/16	Station 6	A	242 S Solomon at Palmyra	Station being rebuilt. 1 pump total; portable pump outside operational.
14	06/07/16	Station 3	A	8720 Olive near Eagle	2 pumps total; both operational.
15	06/07/16	Station 1	A	7336 Cohn	2 pumps total; both operational.
16	06/07/16	Station 14	A	4000 Clara	2 primary pumps total; both operational, temp pump on site not in service.
17	06/07/16	Station 5	A	3912 Erato St	2 pumps total; both operational.
18	06/07/16	Station 15	A	2431 Palmyra near Rocheblave	3 pumps; all operational.
19	06/07/16	Station 8	A	Corner of N Broad and Toulouse	2 pumps total; both operational.
20	06/25/15	Station 9	A	2540 Annette at Law	2 pumps total; both operational.
21	06/06/16	Station 16	B	3751 N Miro at	2 pumps total; both operational.

	DATE	FACILITY NAME	ROUTE	LOCATION	STATUS
				Pauline	
22	06/06/16	Station 24	B	5027 N Tonti at Forstall	2 pumps total; 1 operational.
23	06/06/16	Station 25	B	2245 Charbonnet	2 pumps total; 1 operational.
24	06/06/16	Station 26	B	2244 St Maurice at Tonti	2 pumps total; 1 operational.
25	06/06/16	Station B	B	4725 St Claude Avenue	2 pumps total; both operational.
26	06/06/16	Southern Scrap	B	Southern Scrap Rd	2 pumps total; both operational.
27	06/06/16	France & Florida	B	Harbor Rd	2 pumps total; both operational.
28	06/06/16	MECO	B	2701 France Road	2 pumps total; both operational.
29	06/06/16	American Marine	B	3855 France Road	2 pumps total; both operational.
30	06/06/16	Victoria at Gentilly	B	3620 Victoria	2 pumps total; both operational.
31	06/06/16	Dodt	B	8118 Chef Menteur Highway	Station being re-built. One (1) pump total; portable pump outside operational
32	06/06/16	PlumOrchid	B	7300 Chef Menteur Highway	Station being rebuilt. 1 pump total; portable pump outside operational
33	06/06/16	Wilson	B	7709 Wilson Avenue	2 pumps total; both operational.
34	06/06/16	Crowder	B	5500 Crowder Road	2 pumps total; both operational.
35	06/06/16	Castle Manor	B	4950 Gawain at Dwyer	2 pumps total; both operational.
36	06/06/16	Cerise	B	5001 Cerise	2 pumps total; 1 operational.
37	06/06/16	Lakewood Terrace	B	5057 Warren Drive	2 pumps total; 1 operational.
38	06/06/16	McCoy	B	McCoy at Gentilly	2 pumps total; both operational.
39	06/06/16	Amid	B	6800 Almonaster Road	2 pumps total; both operational.
40	06/06/16	Lake Forest	B	10451 Lake Forest Blvd	Station newly rebuilt, but not yet turned over to S&WB. 2 pumps total; both operational.
41	06/06/16	Wright Road	B	Wright Road at Lake Forest	2 pumps total; both operational.

	DATE	FACILITY NAME	ROUTE	LOCATION	STATUS
42	06/06/16	Bullard	B	5501 Bullard Road	Station newly rebuilt, but not yet turned over to S&WB. 2 pumps total; both operational.
43	06/06/16	Pines Village	B	6155 Dwyer Road at Foch	2 pumps total; both operational.
44	06/06/16	America	B	6789 Dwyer Road at Westlake	2 pumps total; 1 operational.
45	06/06/16	Station A	B	1321 Orleans Avenue	6 pumps total; 5 operational.
46	06/07/16	Shorewood	C	14441 Morrison Road	2 pumps total; both operational.
47	06/07/16	Briarwood	C	13701 Morrison Road	2 pumps total; both operational.
48	06/07/16	Liggett	C	12501 Morrison Road	2 pumps total; both operational.
49	06/07/16	Berg	C	11501 Morrison Road	2 pumps total; both operational.
50	06/07/16	Weber	C	10141 Morrison Road	2 pumps total; both operational.
51	06/07/16	Burke	C	9001 Morrison Road	2 pumps total; both operational.
52	06/07/16	Lawrence	C	7900 Morrison Road	Station newly rebuilt, but not yet turned over to S&WB. 2 pumps total; both operational.
53	06/07/16	Lamb	C	6450 Morrison Road	2 pumps total; both operational.
54	06/07/16	Gentilly Oaks	C	5000 Papania Road at Vienna	2 pumps total; 1 operational. Pump 2 not working.
55	06/07/16	Eastover	C	6051 Eastover Drive	2 pumps total; both operational.
56	06/07/16	Paris Road	C	Dwyer West of Paris Road	2 pumps total; both operational.
57	06/07/16	Venetian Isles 2	C	20711 Old Spanish Trail	2 pumps total; both operational.
58	06/07/16	Industrial Parkway	C	4200 Industrial Parkway	2 pumps total; 1 operational. Pump 2 not working.
59	06/07/16	Blvd X	C	4433 Chef Menteur Highway	2 primary pumps not operational and being rebuilt, 2 temporary pumps operational.

	DATE	FACILITY NAME	ROUTE	LOCATION	STATUS
60	06/07/16	Alcee Fortier	C	Alcee Fortier Blvd at the Levee	2 pumps total; both operational.
61	06/07/16	Willow Brook	C	Willowbrook off of Michoud	2 pumps total; 1 operational. Pump 2 not working.
62	06/07/16	Oak Island	C	14201 Michoud Blvd	2 pumps total; both operational.
63	06/07/16	Village de Lest	C	11324 Dwyer	2 pumps total; 1 operational. Pump 2 not working.
64	06/07/16	Michoud	C	4400 Michoud Blvd	2 pumps total; both operational.
65	06/07/16	Folgers	C	14601 Gentilly Blvd	2 pumps total; both operational.

Assessment of West Bank Sewage Stations

	DATE	FACILITY NAME	LOCATION	STATUS
1	06/08/16	Memorial	2501 Memorial Park Dr	2 pumps total; both operational.
2	06/08/16	Garden Oaks	3201 Memorial Park Dr	2 pumps total; 1 pump operational.
3	06/08/16	Park Timbers	4100 Lennox Blvd	2 pumps total; both operational.
4	06/08/16	Tall Timbers	3800 Tall Pines Dr	2 pumps total; both operational.
5	06/08/16	Forest Isle	5631 West Forest Park Dr	2 pumps total; both operational.
6	06/08/16	Blair	3800 Blair St	2 pumps total; both operational.
7	06/08/16	Aurora	6000 Carlisle Ct	2 pumps total; both operational.
8	06/08/16	English Turn I	2201 Stanton Rd	2 pumps total; both operational.
9	06/08/16	English Turn II	123 ½ Oak Alley	2 pumps total; both operational.
10	06/08/16	English Turn III		2 pumps total; both operational.
11	06/08/16	Lower Coast	3700 Old Woodland	2 pumps total; both operational.
12	06/08/16	Woodland	4150 Woodland Dr	2 pumps total; both operational.
13	06/08/16	Eton	3440 Eton St	2 pumps total; both operational.
14	06/08/16	Huntlee	3201 Huntlee Dr	2 pumps total; 1 pump operational.
15	06/08/16	Holiday	2799 Holiday Dr	2 pumps total; both operational.
16	06/08/16	Bridge Plaza	2914 Vespasian St	2 pumps total; both operational.
17	06/08/16	Horace	3301 Lawrence St	2 pumps total; both operational.

Assessment of East Bank Drainage Stations

	DATE	FACILITY NAME	LOCATION	STATUS	NOTES
1	06/06/16	Station 1	2501 S .Broad St	11 pumps total; 10 operational, No. 1 constant duty pump not in service.	
2	06/06/16	Station 6	345 Orpheum	Fourteen (14) pumps total; eleven (11) pumps operational, 2 constant duty pumps and pump I out of service	
3	06/08/16	I-10 Station	I-10 Service Road	Four (4) pumps total; four (4) pumps operational	Four (4) vertical pumps one (1) of which is a constant duty pump
4	06/06/16	Station 7	5741 Orleans Ave at Marconi Dr	5 pumps total; 4 pumps operational.	Pump C is out of service due to electrical issues.
5	06/08/16	Canal Blvd	5500 Canal Blvd	3 pumps total; all operational.	
6	06/06/16	Station 2	444 N. Broad St	6 pumps total; all operational.	No change from previous year.
7	06/06/16	Station 3	2251 N Broad St	9 pumps total; 4 pumps out of service.	Constant duty pumps 1, 2, 3 & 4 are out of service.
8	06/08/16	Pritchard	2901 Monticello	3 pumps total; all in service.	No change from previous year.
9	06/08/16	Oleander	9400 Oleander	3 pumps total; 3 in service.	No change from previous year.
10	06/06/16	Station 4	5700 Warrington Dr	6 pumps total; all operational.	
11	06/08/16	Station 12	Robert E Lee and Ponchartrain Blvd	1 pump total, 1 in service.	No change from previous year.
12	06/07/16	Station 16	Danube Rd at Wales	4 pumps total; all in service.	No change from previous year.
13	06/07/16	Station 10		4 pumps total; all in service.	No change from previous year.
14	06/07/16	Station 14	Oneida at Haynes	4 pumps total; all operational.	

	DATE	FACILITY NAME	LOCATION	STATUS	NOTES
15	06/07/16	Grant	Grant St at Gentilly Blvd	6 pumps total; 5 in service.	2 pumps inside, both operational; 4 pumps outside, 3 operational. No change from previous year.
16	06/07/16	Elaine		2 pumps total; both operational.	No change from previous year.
17	06/06/16	Station 17	2801 Florida Ave	2 pumps total; all in service.	2 drainage pumps operating on one motor. 3 sewage pumps also at this facility; all operational. No change from previous year.
19	06/07/16	Station 5	Florida Ave	8 pumps total; all operational.	6 pumps at old station, 2 pumps at new station. No change from previous year.
20	06/07/16	Station 19	4500 Florida Ave	5 pumps total; all in service.	No change from previous year.
21	06/07/16	Station 20	6300 Intercostal Waterway at Terminal Rd	2 pumps total; 1 operational, 1 out of service.	Pump 1 out of service. No change from previous year.
22	06/07/16	Station 15	Industrial Parkway	3 pumps total; all in service.	No change from previous year.
23	06/07/16	Dwyer	5801 Dwyer Rd	3 pumps total; all in service.	No change from previous year.
24	06/07/16	Maxent	Alcee Fortier	2 pumps total; both operational.	No change from previous year.

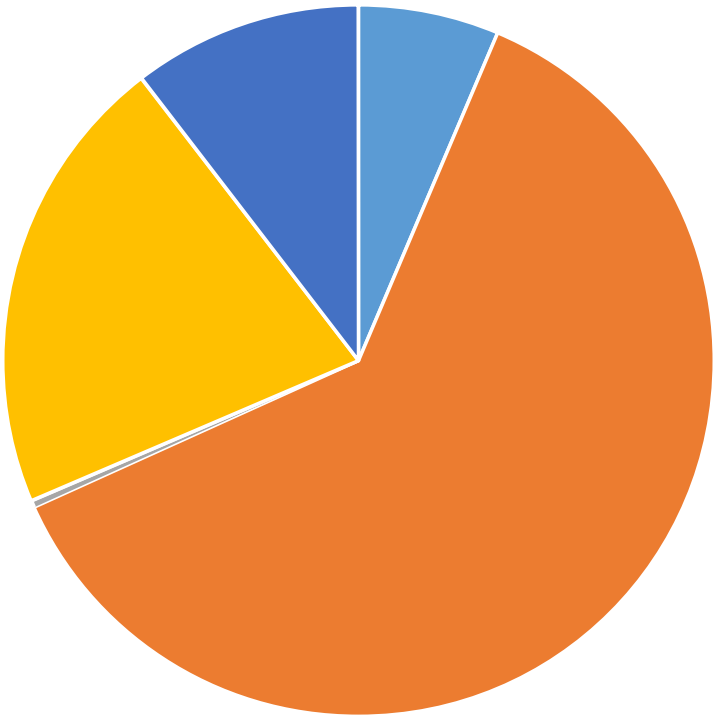
Assessment of West Bank Drainage Stations

	DATE	FACILITY NAME	LOCATION	STATUS	NOTES
1	06/03/16	Station 11	5301East Sixth St	5 pumps total; 4 pumps operational.	Stations has 4 major pumps and 1 constant duty pump, 1 major pump out of service being rebuilt with no date for completion of repair. No change from previous year.
2	06/03/16	Station 13	4201 Tall Spruce Dr	7 pumps total; all in service	No change from previous year.

Current Capital Projects

Total Program
Phase Breakdown

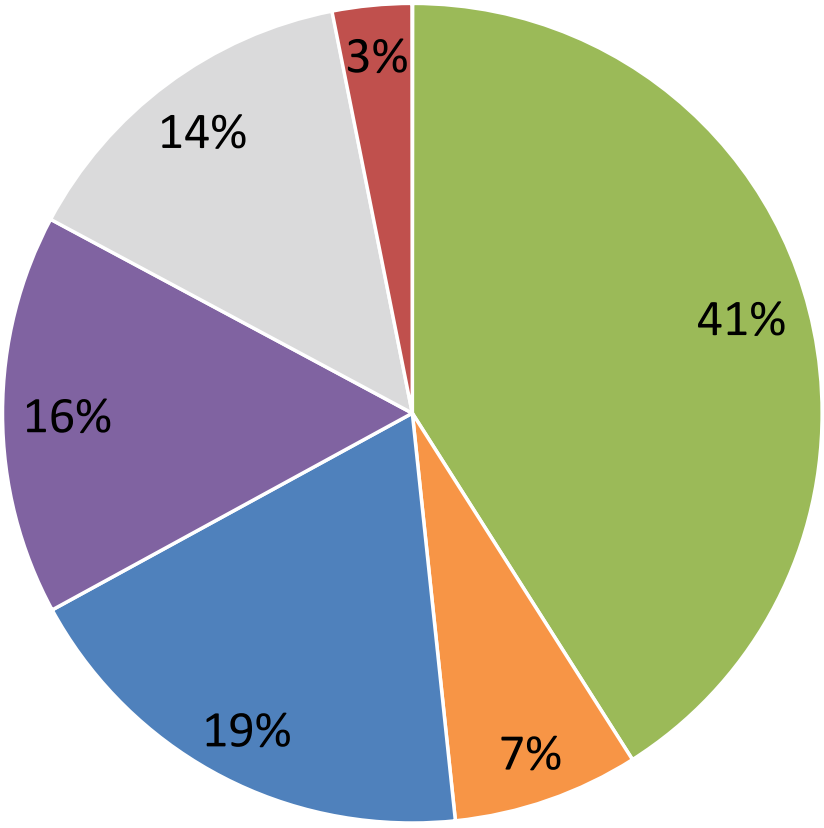
Total 253 Projects - $ 1.2 billion



Completed	$78 million	6%
Construction	$764 million	62%
Bid & Award	$3.8 million	0%
Design	$259 million	21%
Planning	$128 million	11%

SWB Projects
System Breakdown

Total 253 Projects - $ 1.2 billion



- Drainage
  $506,300,690.62
- Sewerage
  $90,724,009.90
- Water
  $231,212,419.38
- Combined/Power
  $195,047,946.98
- Joint Projects
  $173,242,724.41
- Emergency Drainage
  $38,823,262.53

Active Capital Projects

ID	Council District	Name	Scope	Budget	Current Project Phase	Est Start Qtr	Est Complete Qtr
C008	A, B	HMGP-Feeders from Power Plant to DPS1	Installing two feeders from CWP to drainage pumping station #1.	$4,628,919.90	Completed	2016 - Q4	2017 - Q4
DPW067	C, D	N. Galvez (Elysian Fields - Almonaster)	Reconstruction of existing roadway, including replacement of affected utilities	$1,455,827.70	Completed	2015 - Q3	2017 - Q2
DPW076	B	Gravier St. (S. Galvez to S. Broad)	Reconstruction of existing roadway, including the replacement of affected utilities	$2,211,872.70	Completed	2016 - Q1	2017 - Q4
DPW092	A	S. Johnson - Melodia Ct.	Reconstruction of existing roadway, including the replacement of affected utilities.	$588,259.95	Completed	2016 - Q4	2017 - Q4
DPW442	B	Jackson Ave (S. Claiborne - Tchoupitoulas)	Reconstruction of existing roadway, including the replacement of affected utilities	$81,980.00	Completed	2016 - Q3	2017 - Q3
DPW449	D	Aubry St (Broad - Gentilly)	This project will perform roadway improvements on Aubry Street from North Broad to Gentilly Boulevard, including installation of new subsurface utilities including drain lines, sewer, and water lines.	$712,277.50	Completed	2016 - Q4	2017 - Q3
ER.DPS.25HZ	C, D, E, A, B	Purchase of five 25 Hz generators	Emergency generator purchase and installation	$13,878,409.09	Completed	2017 - Q3	2017 - Q3
ER.DPS.TG	C, D, E, A, B	Rental of temporary generators	Emergency temporary generator rental at CFC, DPS 4, DPS 10 Citrus, Dwyer, Grant, Maxent, Oleander, Elaine, SPS A, plus A/C units at Power House 1 and PFC	$5,537,025.44	Completed	2017 - Q3	2017 - Q3
ER.DPS01.CD1	B	DPS 1 - Constant Duty Pump 1	Repair bearing failure and seat	$231,186.00	Completed	2017 - Q3	2017 - Q3
ER.DPS01.V2	B	DPS 1 - Vertical Pump 2	Repair impellar & damaged shaft	$254,199.00	Completed	2017 - Q3	2017 - Q3
ER.DPS05.EP	E	DPS 5 - Emergency pump rental	Rental, installation and crane costs for emergency pump	$115,480.00	Completed	2017 - Q3	2017 - Q3
ER.DPS06.C	A	DPS 6 - Pump C	Repair of impellar and damaged shaft	$164,144.50	Completed	2017 - Q3	2017 - Q3
ER.DPS06.CD1	A	DPS 6 - Constant Duty Pump 1	Predecessor to 6260 - balance rotor (reassemble pump, shaft and realignment)	$80,000.00	Completed	2017 - Q3	2017 - Q3
ER.DPS06.CD1.1	A	DPS 6 - Constant Duty Pump 1	Balance rotor, need to VPI, test and install	$191,155.50	Completed	2017 - Q3	2017 - Q3
ER.DPS06.D	A	DPS 6 - Motor D	Shaft, bearings and impellar repairs	$52,337.50	Completed	2017 - Q3	2017 - Q3
ER.DPS06.F	A	DPS 6 - Motor F	Reassemble pump, shaft and realignment	$196,197.50	Completed	2017 - Q3	2017 - Q3
ER.DPS07.C	A	DPS 7 - Pump C	Repair bearing failure and seat	$186,602.50	Completed	2017 - Q3	2017 - Q3
ER.DPS07.EP	A	DPS 7 - Emergency pump rental	Rental, installation and crane costs for emergency pump	$82,300.00	Completed	2018 - Q3	2018 0 Q3
ER.DPS11.D	C	DPS 11 - Pump D	Reassemble pump, bearing shaft, and realignment	$98,472.00	Completed	2017 - Q3	2017 - Q3
ER.DPS11.E	C	DPS 11 - Pump E	Reassemble pump, bearing shaft, and realignment	$173,692.00	Completed	2017 - Q3	2017 - Q3
ER.DPS17.TG	E	DPS 17 "Station D" - Temporary generator purchase and wiring	Purchase of temporary generator and wiring	$3,369,148.00	Completed	2017 - Q3	2017 - Q3
ER.UPS02.TG	A	UPS 2 - Canal Blvd - temporary generator rental	Emergency temporary generator rental	$78,547.00	Completed	2017 - Q3	2017 - Q3
ER.UPS03.TG	D	UPS 3 - Franklin Ave - temporary generator rental	Emergency temporary generator rental	$78,540.00	Completed	2017 - Q3	2017 - Q3

Water Sewerage Drainage Combo/Power Joint Project Emergency Repair Note: Joint Projects are part of the Joint Infrastructure Program with the City of New Orleans, with DPW as facilitator.

ID	Council District	Name	Scope	Budget	Current Project Phase	Est Start Qtr	Est Complete Qtr
ER.UPS04.TG	E	UPS 4 - Hospital - temporary generator rental	Emergency temporary generator rental	$78,540.00	Completed	2017 - Q3	2017 - Q3
ER.UPS05.TG	A	UPS 5 - New Carrollton - temporary generator rental	Emergency temporary generator rental	$78,540.00	Completed	2017 - Q3	2017 - Q3
ER.UPS06.M	A	Underpass Pump Station 06 - Old Carrollton - Electric Rewind of Motor	Electric rewind of motor	$43,578.00	Completed	2017 - Q3	2017 - Q4
ER.UPS06.SP	A	UPS 6 - Old Carrollton - spare parts for pump	Spare parts/pump for Old Carrollton underpass station	$28,563.00	Completed	2017 - Q3	2017 - Q3
ER.UPS06.TG	A	UPS 6 - Old Carrollton - temporary generator rental	Emergency temporary generator rental	$78,540.00	Completed	2017 - Q3	2017 - Q3
ER.UPS07.TG	D	UPS 7 - Paris Ave - temporary generator rental	Emergency temporary generator rental	$78,540.00	Completed	2017 - Q3	2017 - Q3
ER.UPS09.TG	D	UPS 9 - Press Dr - temporary generator rental	Emergency temporary generator rental	$78,540.00	Completed	2017 - Q3	2017 - Q3
ER.UPS10.TG	D	UPS 10 - St. Bernard Ave - temporary generator rental	Emergency temporary generator rental	$78,540.00	Completed	2017 - Q3	2017 - Q3
S001	C, D, E, A, B	Restoration of Existing Gravity Sewer Mains in Various Locations	Restore basin in Uptown, 9th Ward, and Carrollton.	$5,032,700.00	Completed	2013 - Q4	2017 - Q3
S002	C, D, E, A, B	Restoration of Existing Gravity Sewer Mains in Various Locations	Restore basin in Lake View, Gentilly, S. Shore, and Mid-City.	$4,759,309.00	Completed	2014 - Q2	2017 - Q4
S014	E	DODT SPS	Restoration of sewer pump station from Hurricane Katrina damage.	$1,518,397.45	Completed	2014 - Q1	2017 - Q3
S015	E	Plum Orchard SPS	Restoration of sewer pump station from Hurricane Katrina damage.	$1,246,542.01	Completed	2014 - Q1	2017 - Q3
S016	A	Mistletoe 18" sewer line	Replacement of 18" sewer main.	$1,439,277.94	Completed	2015 - Q3	2017 - Q3
W005	B	A&B Pumps and Auxiliaries at Carrollton Water Plant	Repairs to Pumps A & B from Hurricane Katrina Damage.	$18,295,141.33	Completed	2011 - Q3	2018 - Q1
W006	B	Replacement of Pump Package @ CWP	Repairs & service two lift pumps, steam turbine drivers, & auxiliary equipment.	$6,207,477.43	Completed	2012 - Q3	2017 - Q3
W044	D	Garage No. 1 at Central Yard	Repairs to Garage no. 1 Building & Roof.	$3,024,637.28	Completed	2014 - Q3	2017 - Q3
W045	D	Garage No. 2 at Central Yard	Repairs to Garage No. 2 Electrical System.	$2,379,559.81	Completed	2015 - Q2	2017 - Q4
C001	B	HMGP - Modifications to Oak Street Raw Intake Station	Upgrades to Oak Street Raw Intake Station.	$26,231,874.85	Construction	2017 - Q2	2019 - Q4
C002	A	HMGP - Emergency Fuel Storage	Construction of New Fuel Storage Tanks.	$11,029,650.09	Construction	2015 - Q3	2019 - Q1
C004	A	HMGP- Structural General	Structural Repairs from Hurricane Katrina Damage.	$4,662,846.12	Construction	2015 - Q4	2018 - Q2
C007	A	HMGP - Generator 4 Retrofit	Installation of new generators.	$13,452,101.27	Construction	2013 - Q2	2018 - Q2
C009	D, A, B	HMGP - Retrofit Power Distribution Network	Repairs to Power System. Gentilly Blvd @ St. Bernard Ave	$32,272,982.72	Construction	2015 - Q2	2019 - Q2
C010	A	HMGP - Generator Load Bank	Installation of new generators. Load bank in plant.	$7,317,063.33	Construction	2014 - Q3	2019 - Q1
C011	C, D, E, A, B	Service Connections - new installation	Installation of new water, sewer, and drainage service connections at various sites throughout Orleans Parish	$2,336,550.00	Construction		
D002	B	SELA Louisiana Ave Canal	Construction of 7300 LF box culvert.	$87,691,469.81	Construction	2014 - Q1	2018 - Q2

Water Sewerage Drainage Combo/Power Joint Project Emergency Repair Note: Joint Projects are part of the Joint Infrastructure Program with the City of New Orleans, with DPW as facilitator.

ID	Council District	Name	Scope	Budget	Current Project Phase	Est Start Qtr	Est Complete Qtr
D003.1	E	SELA Florida Ave Canal- PH II & III	Construction of 4500 LF concrete culvert from Mazant to St. Ferdinand.	$120,694,876.25	Construction	2014 - Q3	2018 - Q4
D003.2	E	SELA Florida Ave Canal- PH IV	Construction of pile founded flume & pile founded culverts.	$150,597,492.09	Construction	2014 - Q3	2022 - Q4
D005.1	B	SELA S. Claiborne Ave Canal- PH I	Construction of 2500 LF concrete box Monticello to Leonidas.	$33,360,008.66	Construction	2017 - Q1	2019 - Q4
D005.2	B	SELA S. Claiborne Ave Canal- PH II	Construction of 3500 LF concrete box Leonidas to Lower line.	$30,216,421.08	Construction	2012 - Q2	2017 - Q3
D006	B	SELA Jefferson Ave- PH I	Construction of 4400 LF Concrete Box for Claiborne to Dryads.	$62,766,590.60	Construction	2013 - Q3	2018 - Q2
D009	D	Broad Underpass Drainage Pump Station	Restoration of Underpass Drainage Pump Station from Hurricane Katrina Damage.	$1,293,819.95	Construction	2016 - Q4	2018 - Q1
D015	A	Metairie Relief Canal	Joint project with Jefferson Parish - Widen existing Metairie Relief Canal from Palmetto to Airline Hwy	$7,535,000.00	Construction	2016 - Q3	2017 - Q4
D019	E	DPS 17 - Station D Mechanical/Structural Repairs		$1,459,711.51	Construction		2017 - Q4
DPW059	A	Fleur de Lis Phase III (30th St - Hammond Hwy)	Reconstruction of existing roadway, including the replacement of affected utilities	$5,555,935.00	Construction	2017 - Q1	2018 - Q3
DPW120	E	Michoud Blvd (Chef Menteur Blvd – Dwyer Rd)	Full reconstruction, rehabilitatin of water & drain lines	$1,122,488.09	Construction	2017 - Q1	2018 - Q2
DPW441	B	S. Galvez (Toledano - MLK BLVD)	Full reconstruction of concrete roadway including all underground utilities. Installation of ADA compliant curb ramps, new sidewalks, driveways, landscaping, street lights and striping of crosswalks and a dedicated bike lane.	$910,490.00	Construction	2016 - Q4	2018 - Q2
DPW445	D	Youth Study Center	May include underground infrastructure improvements, roadway resurfacing and installation of ADA compliant curb ramps, sidewalks and driveway aprons near the Youth Study Center.	$130,171.80	Construction	2016 - Q3	2017 - Q4
DPW585	C	French Quarter Safety	Safety improvements and insfrastructure repairs to French Quarter streets, including installation of bollards to prevent automobile traffic, etc.	$2,264,483.50	Construction		
DPW589	C	Bourbon St (Canal St - Dumaine St)	May include replacement of existing drain lines, existing water mains/house connections, sewer mains/house connections	$0.00	Construction		2017 - Q4
DPW595		Henry Clay (St Charles Ave - Hurst)			Construction		
ER.DPS05.CD2	E	DPS 5 - Constant Duty Pump 2 L/R	Repair impellar failure and damaged shaft	$586,176.00	Construction	2017 - Q3	2017 - Q4
ER.DPS06.CD2	A	DPS 6 - Constant Duty Pump 2	Repair impellar failure and damaged shaft	$142,447.50	Construction	2017 - Q3	2017 - Q4
ER.DPS06.I	A	DPS 6 - Pump I	Shaft, bearings and impellar repairs	$1,690,216.00	Construction	2017 - Q3	2017 - Q4
ER.DPS11.B	C	DPS 11 - Pump B	Repair pump - seized	$240,930.00	Construction	2017 - Q3	2017 - Q4
ER.DPS15.2	E	DPS 15 - Pump 2	Repair gear box and reinstall	$497,376.00	Construction	2017 - Q3	2017 - Q4
ER.DPS20.1	E	DPS 20 "Amid" - Pump 1	Repair and reinstall angle drive, shaft, impellar and casing	$1,312,810.00	Construction	2017 - Q3	2017 - Q4

Water Sewerage Drainage Combo/Power Joint Project Emergency Repair Note: Joint Projects are part of the Joint Infrastructure Program with the City of New Orleans, with DPW as facilitator.

ID	Council District	Name	Scope	Budget	Current Project Phase	Est Start Qtr	Est Complete Qtr
ER.PS.C	C, D, E, A, B	CH2M - Professional Services - Program Management	Emergency Operations Maintenance for DPS Repairs	$3,000,000.00	Construction	2017 - Q3	2017 - Q4
ER.PS.D	A	Diving Inspections	Emergency diving inspection services	$300,000.00	Construction	2017 - Q3	2017 - Q4
ER.PS.V	C, D, E, A, B	Veolia - Professional Services - Resiliency & Assets Management Study	Resiliency & Assets Management Study	$3,000,000.00	Construction	2017 - Q3	2017 - Q4
ER.T5	A	Turbine #5 Emergency Repairs	Emergency repairs to Turbine #5	$1,200,000.00	Construction	2017 - Q3	2017 - Q4
ER.UPS02.PG	A	Underpass Pump Station 02 - Canal Street	Installation of Permanent Generator.	$252,890.00	Construction	2017 - Q3	2017 - Q4
ER.UPS03.PG	D	Underpass Pump Station 03 - Franklin Ave	Installation of Permanent Generator.	$278,050.00	Construction	2017 - Q3	2017 - Q4
ER.UPS05.PG	A	Underpass Pump Station 05 - New Carrollton	Installation of Permanent Generator.	$269,420.00	Construction	2017 - Q3	2017 - Q4
ER.UPS07.PG	D	Underpass Pump Station 07 - Paris Ave	Installation of Permanent Generator.	$277,250.00	Construction	2017 - Q3	2017 - Q4
ER.UPS09.PG	A	Underpass Pump Station 09 - Press Dr	Installation of Permanent Generator.	$361,000.00	Construction	2017 - Q3	2017 - Q4
RR083	A	RR3 - Lakeview North Group A (INC)	Replace identified damaged water main segments in Lakeview.	$396,917.06	Construction	2017 - Q2	2018 - Q1
S003	E	Electrical Modifications to the Effluent Pump House	Adjustments to Effluent Pump House electrical system.	$5,771,314.81	Construction	2016 - Q3	2018 - Q1
S004	C	Horace, Huntlee, Eton, Holiday SPS EDC's	Restoration of Sewer Pump Station from Hurricane Katrina Damage.	$338,707.00	Construction	2017 - Q3	2017 - Q3
S006	E	BISI Sludge Dryer Purchase	Acquisition of new BISI sludge dryer.	$4,684,027.87	Construction	2016 - Q4	2017 - Q4
S010	E	New Orleans East Basin Plum Orchard Sewer Rehabilitation	Restoration of basin under consent decree	$6,827,860.00	Construction	2017 - Q1	2019 - Q4
S011	E	New Orleans East Basin Read Blvd West / West Lake Forest Rehabilitation	Restoration of basin under consent decree	$3,397,886.73	Construction	2016 - Q4	2019 - Q4
S012	E	New Orleans East Basin Read Blvd East/Viavant Sewer Rehabilitation	Restoration of basin under consent decree	$5,801,851.80	Construction	2017 - Q2	2019 - Q4
S019	D	Rewind of the sewage pump motor at Sewage Pumping Station 21	Repairs to SPS 21 Motor.	$93,610.00	Construction	2017 - Q1	2017 - Q3
S028	E	New Orleans East Basin/Village de L'Est/Venetian Isles Sewer Rabilitiation	Sewer system rehab of existing gravity sewer mains via replacement of CIPP lining manhole in association with SSERP	$3,654,490.00	Construction	2017 - Q2	2017 - Q4
S084	D	SPS #8	Construction of New Sewer Pump Station on Lafitte St.	$9,545,231.83	Construction	2017 - Q1	2018 - Q3
S085	C, D, E, A, B	Gravity Sewer Mains	Restoration of existing gravity flow sanitary sewers by excavation from manhole-to- manhole, CIPP Lining from manhole-to- manhole, CIPP lining of service laterals and point pepair at various Sites throughout the City of New Orleans	$3,988,738.00	Construction		

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S086	C, D, E, A, B	Gravity Sewer Mains restoration	Restoration of existing gravity flow sanitary sewers by excavation from manhole-to- manhole, CIPP Lining from manhole-to- manhole, CIPP lining of service laterals and point pepair at various Sites throughout the City of New Orleans	$4,771,990.44	Construction		
W003	A	Filter backwash equipment	Replacement of Backwash Equipment. Current Construction Location 8800 S. Claiborne Ave.	$1,435,908.58	Construction	2017 - Q3	2018 - Q3
W004	B	Turbine 4 Repairs	Repair Turbine #4 and ancillary equipment.	$17,484,866.14	Construction	2012 - Q1	2018 - Q2
W015	B	Carrollton Water Plant: boiler , duct and elevator	Repair to Plant from Hurricane Katrina Damage.	$19,422,074.04	Construction	2014 - Q4	2017 - Q3
W016	A	SFG air compressor	Replacement of Air Compressor.	$375,000.00	Construction	2017 - Q1	2017 - Q3
W019	E	Painting of Concrete Water Storage Tanks @ MWP	Paint (4) Four Million Gallon Concrete Storage Tanks at CWP	$740,163.02	Construction	2014 - Q4	2017 - Q4
W022	E	Secondary chlorination station at Venetian Isles	Installation of Secondary Chlorination @ Venetian Isles.	$891,300.00	Construction	2017 - Q2	2017 - Q3
W024	A	Water Hammer HMP - Elevated Storage Tanks	Construction of New Elevated Storage Tanks. CWP	$38,131,457.73	Construction	2016 - Q4	2019 - Q2
W025	E	Improvements to Michaud Water Tower	Restoration from Hurricane Katrina Damage.	$5,749,700.00	Construction	2017 - Q2	2017 - Q4
W029	B	CBD/French Quarter WLRP	Replace water lines and new pavement.	$10,444,049.25	Construction	2013 - Q3	2017 - Q4
W038	D	Electrical equipment at Garage No. 2 and Main Power Building	Repairs to Electrical System in Garage No. 2 & Main Building.	$2,081,125.91	Construction	2016 - Q3	2018 - Q1
W051	C, D, E, A, B	Water Main Line replacements	Water Main Line replacements and extensions throughout Orleans parish.	$1,777,140.00	Construction		
DPW144	E	Old Spanish Trail (Nighthart St - Sherwood Dr)	Full Reconstruct - existing roadway, including replacement of affected utilities.	$700,000.00	Bid & Award	2018 - Q3	2018 - Q4
DPW456	C, D, E, A, B	Isaac Drainage Point Repairs	Improve drainage conditions throughout the city, including cleaning of catch basins, manholes and point repairs to drainage lines	$0.00	Bid & Award	2017 - Q4	2018 - Q4
ER.DPSGRANT.2	E	DPS "Grant" - Pump 2	New pump and new motor	$51,940.00	Bid & Award	2017 - Q3	2017 - Q4
ER.DPSGRANT.4	E	DPS "Grant" - Pump 4	New pump and new motor	$51,940.00	Bid & Award	2017 - Q3	2017 - Q4
ER.UPS04.PG	E	Underpass Pump Station 04 - Hospital	Installation of Permanent Generator.		Bid & Award	2017 - Q3	2018 - Q1
ER.UPS08.PG	D	Underpass Pump Station 08 - Ponchartrain Blvd	Installation of Permanent Generator (?)		Bid & Award	2017 - Q3	2017 - Q4
ER.UPS10.PG	D	Underpass Pump Station 10 - St Bernard Ave	Installation of Permanent Generator.		Bid & Award	2017 - Q3	2018 - Q1
RR051	D, E	RR3 - Gentilly Terrace Group A (INC)	Replace identified damaged water main segments in Gentilly Terrace.	$726,678.48	Bid & Award	2017 - Q4	2018 - Q3
RR103	E	RR3 - LNW Northeast Group A (INC)	Replace identified damaged water main segments in lower Ninth Ward-South.	$344,615.30	Bid & Award	2017 - Q3	2018 - Q3
RR108	E	RR3 - LNW Northwest Group A (PMOI)	Replace identified damaged water main segments in Lower Ninth Ward-South.	$924,344.20	Bid & Award	2017 - Q4	2018 - Q4
RR144	E	RR3 - Read Blvd East Group A (PMOPI)	Replace identified damaged water main segments in Read Blvd East.	$147,151.56	Bid & Award	2017 - Q4	2018 - Q4

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RR152	E	RR3 - Read Blvd West Group A (PMOI)	Replace identified damaged water main segments in Read Blvd West.	$350,432.83	Bid & Award	2017 - Q3	2018 - Q2
RR187	E	RR3 - Village de L'Est Group A (PMOI)	Replace identified damaged water main segments in Village de L'Est.	$188,962.63	Bid & Award	2017 - Q3	2018 - Q3
W030	C	Algiers Lock Forebay	12" watermain replacement.	$323,000.00	Bid & Award	2017 - Q3	2018 - Q4
W093	C	New River Intake - silt removal	Removing Silt from the New River Intake		Bid & Award	2018 - Q1	2018 - Q3
W094	C	Algiers Water Plant improvments	Demolition of an existing clarifier, pumps, and piping, construction of a new clarifier, installation of a new vertical turbine pump, replacement of launders and troughs in existing clarifiers, installation of four (4) chemical induction mixers and davit cranes, installation of water quality instruments, abrasive blasting and coating of interior and submerged metals of three (3) existing clarifiers, installation of new fluoride chemical storage and feed system, installation of new CMU walls, CMU wall repairs, door replacements, installation of new doors, installation of gaseous ammonia feed control valves, installation of two large diameter valves and valve vaults, replacement of backflow preventers, exposed piping, yard piping, site work, landscaping, coatings, HVAC, electrical, instrumentation and control improvements, and miscellaneous appurtenances.		Bid & Award	2018 - Q1	2019 - Q3
C003	A	HMGP - Power House	Refurbish of boilers 1,2,3,4,5, and 6. Turbine 3	$50,342,120.90	Design	2018 - Q2	2020 - Q4
C005	A	HMGP -Turbine 5 Refurbishment	Refurbish & upgrade of electrical generators and turbine controls.	$18,449,587.90	Design	2019 - Q3	2021 - Q3
C006	A	HMGP - Turbine 3 Refurbishment	Refurbish & upgrade of electrical generators and turbine controls.	$24,324,249.90	Design	2018 - Q4	2019 - Q4
D001	A	Demolition of C7/C8 Basin	Demo of Basins C7 & C8.	$3,190,607.76	Design	2017 - Q4	2018 - Q4
D008	B	New Carrolton Underpass Drainage Pump Station	Construction of New Carrollton UPSPS.	$807,567.84	Design	2018 - Q1	2019 - Q1
D010	D	Paris Rd. Underpass Drainage Pump Station	Restoration of Underpass Drainage Pump Station from Hurricane Katrina Damage.	$1,074,368.88	Design	2018 - Q1	2019 - Q1
D011	B	Hospital Underpass Drainage Pump Station	Restoration of Underpass Drainage Pump Station from Hurricane Katrina Damage.	$807,571.95	Design	2018 - Q1	2019 - Q1
D012	D	Press Dr. Underpass Drainage Pump Station	Restoration of Underpass Drainage Pump Station from Hurricane Katrina Damage.	$1,073,542.65	Design	2018 - Q1	2019 - Q1
D013	B	Marconi Underpass Drainage Pump Station	Restoration of Underpass Drainage Pump Station from Hurricane Katrina Damage.	$699,349.73	Design	2018 - Q1	2019 - Q1

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D016	C	Gen DeGaulle Canal (Wall to Behrman)	Design improvements to canal - no construction contract associated with this	$1,500,000.00	Design	2014 - Q3	2025 - Q1
D017	C, D, E, A, B	Hydraulic Modeling of Drainage Basins throughout city (for SWB)	Hydraulic modeling of drainage basins (SWB)	$963,291.86	Design	2015 - Q1	2017 - Q4
D018	C, D, E, A, B	Hydraulic Modeling of Drainage Basins throughout city for Green Infrastructure Project (HMGP)	Hydraulic modeling of drainage basins (Green Infrastructure)	$569,000.00	Design	2015 - Q1	2019 - Q1
DPW020		Canal Blvd Reconstruction (Robert E Lee Blvd - Amethyst St)		$666,398.90	Design		
DPW068	D	Gardena (St. Bernard - Paris)	Reconstruction of existing roadway, including the replacement of affected utilities.	$1,300,000.00	Design	2018 - Q1	2018 - Q3
DPW087	A	Homedale, Milne, Walker & Center	Reconstruction of existing roadway, including the replacement of affected utilities.	$1,400,000.00	Design	2018 - Q2	2019 - Q4
DPW111	A	Magazine St Phase II (East Dr - Broadway)	FRC-Reconstruction of existing roadway, including the replacement of affected utilities.	$644,381.23	Design	2018 - Q2	2019 - Q3
DPW112		Magazine St Phase I (Nashville - East Dr)		$538,694.50	Design		
DPW199	B	Camp Street (Louisiana - Washington Ave)	Reconstruction of existing roadway, including the replacement of affected utilities.	$1,285,935.00	Design	2018- Q1	2018 - Q3
DPW213	E	Wright Road (Chef Menteur Blvd - Dwyer Blvd)	Removal of existing roadways and replace with new hot mix asphalt or concrete roadways including new concrete curb and gutter bottom, rehabilitation of water and drain lines.	$0.00	Design	2018 - Q3	2019 - Q4
DPW444	C	St. Claude Drainage Improvements	May include subsurface drainage improvements, installation of green infrastructure, 2 inch mill and overlay and installation of ADA compliant curb ramps.	$297,276.40	Design	2018 - Q1	2018 - Q4
DPW457	A	Cherokee Phase II (Benjamin St. - Pearl St.)	Installing a new subsurface storm water collection and conveyance system in a two block region of Cherokee street for approximately 700 linear feet.	$170,232.88	Design	2018 - Q1	2018 - Q2
DPW458	B	S. Dupre (Canal - Tulane) Gayoso (Canal - Banks)	Reconstruction of existing roadway, including the replacement of affected utilities.	$1,097,600.00	Design	2018- Q1	2018 - Q4
DPW547		Broadmoor Drainage Updates & Green Infrastructure			Design		
DPW549		St Roch Drainage Improvements			Design		
DPW550	A	Hagan-Lafitte (Bayou St. John) drainage upgrades	This project is intended to help alleviate flooding by increasing the capacity of subsurface drainage between local streets and trunk lines, potentially utilizing the St. Louis Canal, as well as by using green infrastructure options which may include retention/detention basins, street basins, rain gardens, and street side bio swales.	$0.00	Design	2018 - Q1	2018 - Q4
DPW551		Lakeview			Design		
DPW582		Oak Park Drainage Updates			Design		

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ER.DPS03.ARV	D	DPS 3 - Anti-Reverse mechanism	Identify & install Anti-Reverse Mechanism		Design	2017 - Q3	
ER.DPS03.BG	D	DPS 3 - Butterfly Gates	Replace/replacement of butterfly gates		Design	2017 - Q3	
ER.DPS04.ARV	D	DPS 4 - Anti-Reverse mechanism	Identify & install Anti-Reverse Mechanism		Design	2017 - Q3	
ER.DPS05.ARV	E	DPS 5 - Anti-Reverse mechanism	Identify & install Anti-Reverse Mechanism		Design	2017 - Q3	
ER.DPS06.ARV	A	DPS 6 - Anti-Reverse mechanism	Identify & install Anti-Reverse Mechanism		Design	2017 - Q3	
ER.DPS07.ARV	A	DPS 7 - Anti-Reverse mechanism	Identify & install Anti-Reverse Mechanism		Design	2017 - Q3	
ER.DPS07.DB	A	DPS 7 - Discharge bells	Investigate & assess replacement of discharge bells		Design	2017 - Q3	
ER.DPS11.ARV	C	DPS 11 - Anti-Reverse mechanism	Identify & install Anti-Reverse Mechanism		Design	2017 - Q3	
ER.DPS11.SC	C	DPS 11 - Screen cleaners	Investigation of screen cleaners		Design	2017 - Q3	
ER.DPS12.CD1	E	DPS 12 - Constant Duty Pump 1	Investigate & assess placement of CD1 - *Inactive for 30 years		Design	2017 - Q3	
ER.DPS12.D	E	DPS 12 - Pump D	Investigate & assess the addition of a flex expansion coupling system		Design	2017 - Q3	
ER.DPS13.SC	E	DPS 13 - Screen cleaners	Investigation of screen cleaners		Design	2017 - Q3	
ER.UPS06.PG	A	Underpass Pump Station 06 - Old Carrollton	(Different approach/not permanent generator)		Design	2017 - Q3	2018 - Q3
RR026	D, E	RR3 - Desire Group A (PMOPI)	Replace identified damaged water main segments in Desire/Development Area.	$406,918.84	Design	2017 - Q4	2018 - Q1
RR037	D	RR3 - Filmore North Group A (PMOI)	Replace identified damaged water main segments in Fillmore.	$1,345,714.34	Design	2017 - Q4	2018 - Q4
RR042	D	RR3 - Filmore South Group A (PMOPI)	Replace identified damaged water main segments in Filmore.	$960,314.33	Design	2017 - Q4	2018 - Q4
RR069	D	RR3 - Lake Terrace & Oaks Group A (PCI)	Replace identified damaged water main segments in Lake Terrace & Oaks	$1,574,149.67	Design	2017 - Q3	2018 - Q3
RR078	A	RR3 - Lakeshore Group A (INC)	Replace identified damaged water main segments in Lakeshore - Lake Vista	$699,747.10	Design	2017 - Q4	2018 - Q4
RR090	A	RR3 - Lakeview South Group A (PMOPI)	Replace identified damaged water main segments in Lakeview.	$396,917.06	Design	2017 - Q4	2018 - Q4
RR094	A	RR3 - Lakewood Group A (PMOI)	Replace identified damaged water main segments in Lakewood.	$709,624.50	Design	2017 - Q3	2018 - Q2
RR130	D	RR3 - Milneburg Group A (PMOPI)	Replace identified damaged water main segments in Milneburg.	$1,549,203.54	Design	2017 - Q4	2018 - Q4
RR133	D	RR3 - Pines Village Group A (PMOI)	Replace identified damaged water main segments in Pines Village.	$6,860,725.18	Design	2017 - Q4	2019 - Q1
RR182	B	RR3 - Treme-Lafitte Group A (INC)	Replace identified damaged water main segments in Treme - Lafitte.	$1,278,016.15	Design	2017 - Q4	2018 - Q3
RR185	B	RR3 - Uptown, West Riverside Group A (PMOPI)	Replace identified damaged water main segments in Uptown.	$2,052,240.61	Design	2017 - Q4	2018 - Q4

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RR191	C	RR3 - West Bank Group A (VAR)	Scope of work may include replacing damaged underground water, sewer and drainage lines, repaving the roadway, repaving the asphalt roadway from curb-to-curb, replacing damaged portions of concrete with new concrete, patching the roadway with asphalt, replacing damaged sidewalks and driveway aprons, and installing ADA compliant curb ramps at intersections.	$197,300.00	Design	2018 - Q1	2018 - Q4
RR192	C	RR3 - West Bank Group B (VAR)	Scope of work may include replacing damaged underground water, sewer and drainage lines, repaving the roadway, repaving the asphalt roadway from curb-to-curb, replacing damaged portions of concrete with new concrete, patching the roadway with asphalt, replacing damaged sidewalks and driveway aprons, and installing ADA compliant curb ramps at intersections.	$0.00	Design	2018 - Q4	2019 - Q4
RR193	A	RR3 - West End Group A (PMOPI)	Replace identified damaged water main segments in West End.	$1,836,909.02	Design	2017 - Q4	2018 - Q4
S005	E	Bio-Reactor Train #4 Clean-out	Clean out of Bio- Reactor Train #4.	$2,211,255.88	Design	2017 - Q4	2018 - Q4
S007	E	Electrical Improvements at the EBWWTP -Phase II	Installation of new MCC's F &G, transformer T-6, and switchgear SG480-2.	$2,696,334.78	Design	2018 - Q1	2019 - Q3
S008	C	Kansas Street Sewer Force	Sewer Force Main Replacement Kansas St. (Seine to Vespasion St.)	$3,872,891.38	Design	2018 - Q1	2019 - Q2
S009	D	Jourdan Road Sewer force Mains	Sewer Force Main Replacement Jourdan Rd (Hayne Blvd to Interstate I-10)	$6,372,891.38	Design	2018 - Q1	2019 - Q4
S021	A	SFG Equipment Purchase & Install	Replace Valves and Actuators for SFG Filter Operations.	$4,200,000.00	Design		
S022	A	Inspection of Turbine 5	Inspection of electrical generators and turbine controls.	$491,203.00	Design	2018 - Q2	2019 - Q2
S026	C, D, E, A, B	Sewer Catch-all (various locations)	Misc Katrina repairs, various locations	$3,649,798.60	Design	2018 - Q3	2019 - Q2
S027	C, D, E, A, B	Sewer Collection Systems Hydraulic Model Update E/W	Hydraulic modeling for sewer collection systems on eastbank and westbank	$2,507,700.00	Design	2014 - Q3	2018 - Q3
S068	C	SPS-A Switchgear Retrofit	Retrofitting the medicum voltate 60 Hz switchgear at SPS-A	$150,000.00	Design	2018 - Q1	2018 - Q2
W001	A	Sludge Line to the River	36" sludge line from plant to river.	$6,150,000.00	Design	2018 - Q1	2019 - Q4
W002	A	Structural Improvements	Structural rehab to Sycamore Filter Gallery pipe supports.	$863,500.00	Design	2017 - Q3	2018 - Q1
W013	A	Water Hammer HMP - Panola/Pump Room	Restoration of Panola water pump station.	$21,406,455.51	Design	2021 - Q2	2023 - Q4
W014	A	Water Hammer HMP - Claiborne/Off Site	Restoration of Claiborne water pump station.	$16,906,455.49	Design	2019 - Q2	2021 - Q4
W017	A	SFG Backwash Pumping Facility	Construct New Backwash Pumping Facility & Modify SFG Piping	$6,390,500.00	Design	2017 - Q4	2018 - Q4
W018	C	Algiers Filters	Restoration of Filters from Hurricane Katrina Damage.	$800,000.00	Design	2017 - Q3	2018 - Q4
W020	C	Arc Flash Analysis, Assessment of Storage Tank Mixing, and Lauder Trough Replacement	Upgrades to drainage mixing electrical system.	$6,117,258.50	Design	2018 - Q1	2019 - Q4

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W021	C, A	Tank Mixing Study, Design, Implementation	Upgrades to drainage mixing system. Relying on completion of CV17-0003	$3,117,258.50	Design	2019 - Q1	2020 - Q3
W023	C	Algiers water tanks	Repairs to Algiers Water Tank from Hurricane Katrina Damage.	$300,000.00	Design	2017 - Q2	2017 - Q4
W026	A	Claiborne Filter Rehab	Restoration of Filters from Hurricane Katrina Damage.	$2,400,000.00	Design	2017 - Q3	2018 - Q4
W027	A	River Intake Stations	Restoration from Hurricane Katrina Damage.	$3,149,227.38	Design	2017 - Q4	2018 - Q2
W031	B	Rehabilitation of Clarifier #2	Restoration of Clarifiers # 2.	$1,349,140.41	Design	2017 - Q3	2018 - Q3
W033	E	BISI Sludge Dryer Installation	Installation of New Sludge Dryer	$4,233,994.36	Design	2018 - Q1	2019 - Q2
W046	A	SWBNO Resiliency Complex	Renovations to Head House, Engineering Building & new infill structure.	$23,171,363.67	Design	2019 - Q1	2022 - Q2
W047	A	S Carrollton Bulk Chemical Storage & Feed Facility	Design and construction of a storage facility	$6,094,665.04	Design	2018 - Q1	2019 - Q3
DPW577		Virginia St (Conte-Rosedale) Conti St (City Park - Rosedale), Rosedale Dr (Virginia-Canal Blvd)			Planning		
DPW594		Bullard Ave (Hayne - Chef Menteur)			Planning		
RR001	B	RR3 - Audubon Group A (PMOPI)	Replace identified damaged water main segments in Audubon.	$2,018,616.64	Planning	2018 - Q1	2019 - Q2
RR003	C, A	RR3 - Bayou St John, Fairgrounds, Seventh Ward Group A (INC)	Replace identified damaged water main segments in Bayou St. John.	$2,723,286.57	Planning	2018 - Q1	2018 - Q4
RR004	D, A	RR3 - Bayou St John, Fairgrounds, Seventh Ward Group B (PMOPC)	Replace identified damaged water main segments in Bayou St. John.	$7,340,739.00	Planning	2018 - Q2	2019 - Q2
RR008	B	RR3 - Black Pearl Group B (FRC)	Replace identified damaged water main segments in Black Pearl.	$2,062,817.00	Planning	2018 - Q4	2019 - Q4
RR009	B	RR3 - Black Pearl, East Carrollton Group A (PMOPI)	Replace identified damaged water main segments in Black Pearl.	$5,291,153.09	Planning	2018 - Q1	2019 - Q2
RR010	B	RR3 - Broadmoor Group A (PMOPI)	Replace identified damaged water main segments in Broadmoor.	$2,430,091.96	Planning	2018 - Q1	2019 - Q2
RR011	A, B	RR3 - Broadmoor Group C (FRC)	Replace identified damaged water main segments in Broadmoor.	$1,546,363.00	Planning	2018 - Q3	2019 - Q3
RR014	A, B	RR3 - BW Cooper, Gert Town, Dixon Group A (PMOI)	Replace identified damaged water main segments in B. W. Copper.	$1,662,141.05	Planning	2018 - Q3	2019 - Q3
RR015	A, B	RR3 - BW Cooper, Gert Town, Dixon Group B (PMOI)	Replace identified damaged water main segments in B. W. Copper.	$3,874,373.04	Planning	2018 - Q4	2019 - Q4
RR020	C	RR3 - Bywater-Marigny Group A (FRCPI)	Replace identified damaged water main segments in Bywater & Marigny.	$1,439,912.92	Planning	2018 - Q2	2019 - Q2
RR021	B	RR3 - Central City Group A (FRC)	Replace identified damaged water main segments in Central City.	$1,848,431.00	Planning	2019 - Q2	2020 - Q2
RR025	A	RR3 - City Park Group A (VAR)	Replace identified damaged water main segments in City Park.	$2,060,348.76	Planning	2018 - Q3	2019 - Q4

Water Sewerage Drainage Combo/Power Joint Project Emergency Repair Note: Joint Projects are part of the Joint Infrastructure Program with the City of New Orleans, with DPW as facilitator.

ID	Council District	Name	Scope	Budget	Current Project Phase	Est Start Qtr	Est Complete Qtr
RR035	B	RR3 - East Riverside, Garden District, Irish Channel, St Thomas Group A (PMOI)	Replace identified damaged water main segments in East Riverside.	$1,305,819.38	Planning	2018 - Q4	2019 - Q4
RR038	D	RR3 - Filmore North Group B (FRC)	Replace identified damaged water main segments in Filmore.	$1,543,905.00	Planning	2018 - Q2	2019 - Q2
RR043	D	RR3 - Filmore South Group B (FRC)	Replace identified damaged water main segments in Filmore.	$1,517,716.00	Planning	2018 - Q2	2019 - Q2
RR046	D	RR3 - Florida Area & Dev Group A (PMOI)	Replace identified damaged water main segments in Florida Area.	$1,542,785.00	Planning	2018 - Q4	2019 - Q4
RR050	B	RR3 - Ferret Group A (PMOI)	Replace identified damaged water main segments in Ferret.	$628,841.34	Planning	2018 - Q1	2018 - Q2
RR062	A	RR3 - Hollygrove Group B (PMOPC)	Replace identified damaged water main segments in Hollygrove.	$2,858,155.00	Planning	2018 - Q3	2019 - Q4
RR067	A	RR3 - Hollygrove, Leonidas Group A (INC)	Replace identified damaged water main segments in Hollygrove.	$4,664,604.90	Planning	2018 - Q1	2018 - Q2
RR072	D	RR3 - Lake Terrace & Oaks Group D (FRC)	Replace identified damaged water main segments in Lake Terrace & Oaks	$1,576,692.00	Planning	2018 - Q4	2019 - Q4
RR073	D	RR3 - Lake Vista Group A (PMOPI)	Replace identified damaged water main segments in Lakeshore - Lake Vista	$89,765.00	Planning	2018 - Q1	2019 - Q1
RR085	A	RR3 - Lakeview North Group C (PMO)	Replace identified damaged water main segments in Lakeview.	$1,209,362.00	Planning	2018 - Q4	2019 - Q4
RR097	A	RR3 - Leonidas Group B (PMOPC)	Replace identified damaged water main segments in Leonidas.	$3,593,289.44	Planning	2018 - Q2	2019 - Q2
RR100	D, E	RR3 - Little Woods Group A (PMOPI)	Replace identified damaged water main segments in Little Woods.	$3,153,467.75	Planning	2018 - Q3	2019 - Q4
RR104	E	RR3 - LNW Northeast Group B (FRCP)	Replace identified damaged water main segments in Lower Ninth Ward-North.	$3,298,230.00	Planning	2018 - Q4	2019 - Q4
RR109	E	RR3 - LNW Northwest Group B (FRC)	Replace identified damaged water main segments in Lower Ninth Ward-North.	$1,989,420.00	Planning	2018 - Q3	2019 - Q3
RR112	E	RR3 - LNW South Group A (PMOI)	Replace identified damaged water main segments in Lower Ninth Ward-South.	$2,084,230.61	Planning	2018 - Q3	2019 - Q3
RR116	A, B	RR3 - Marlyville-Fontainebleau Group A (PMOPI)	Replace identified damaged water main segments in Marlyville - Fontainebleau.	$8,192,262.31	Planning	2017 - Q4	2018 - Q4
RR118	A, B	RR3 - Marlyville-Fontainebleau Group C (FRC)	Replace identified damaged water main segments in Marlyville - Fontainebleau.	$1,005,459.00	Planning	2018 - Q4	2019 - Q4
RR124	A, B	RR3 - Mid-City Group A (INC)	Replace identified damaged water main segments in Mid - City.	$1,774,872.94	Planning	2017 - Q4	2018 - Q3
RR125	A, B	RR3 - Mid-City Group B (PMOPC)	Replace identified damaged water main segments in Mid - City.	$7,804,991.00	Planning	2018 - Q4	2019 - Q4
RR129	B	RR3 - Milan Group A (PMOPI)	Replace identified damaged water main segments in Milan.	$1,059,758.70	Planning	2018 - Q3	2019 - Q3
RR131	D	RR3 - Milneburg Group B (FRC)	Replace identified damaged water main segments in Milneburg.	$1,992,715.00	Planning	2018 - Q4	2019 - Q4

Water Sewerage Drainage Combo/Power Joint Project Emergency Repair Note: Joint Projects are part of the Joint Infrastructure Program with the City of New Orleans, with DPW as facilitator

ID	Council District	Name	Scope	Budget	Current Project Phase	Est Start Qtr	Est Complete Qtr
RR132	A	RR3 - Navarre Group A (FRCPI)	Replace identified damaged water main segments in Navarre.	$892,848.79	Planning	2018 - Q1	2019 - Q1
RR134	D	RR3 - Pines Village Group B (FRC)	Replace identified damaged water main segments in Pines Village.	$882,104.00	Planning	2018 - Q2	2019 - Q2
RR138	E	RR3 - Plum Orchard/West Lake Forest Group A (PMOPI)	Replace identified damaged water main segments in Pines Orchard.	$2,475,099.24	Planning	2019 - Q2	2020 - Q3
RR139	E	RR3 - Plum Orchard/West Lake Forest Group B (PMOPI)	Replace identified damaged water main segments in Pines Orchard.	$2,425,491.23	Planning	2018 - Q4	2019 - Q4
RR140	D	RR3 - Pontchartrain Park Group A (PMOI)	Replace identified damaged water main segments in Pontchartrain Park.	$2,184,038.94	Planning	2018 - Q1	2019 - Q1
RR145	E	RR3 - Read Blvd East Group B (PC)	Replace identified damaged water main segments in Read Blvd East.	$51,257.00	Planning	2018 - Q1	2019 - Q1
RR146	E	RR3 - Read Blvd East Group C (PC)	Replace identified damaged water main segments in Read Blvd East.	$72,113.00	Planning	2018 - Q3	2019 - Q3
RR147	E	RR3 - Read Blvd East Group D (PMOPC)	Replace identified damaged water main segments in Read Blvd East.	$420,476.00	Planning	2018 - Q2	2019 - Q2
RR153	E	RR3 - Read Blvd West Group C (PMOPC)	Replace identified damaged water main segments in Read Blvd West.	$3,737,067.00	Planning	2018 - Q1	2019 - Q1
RR159	D	RR3 - St. Anthony Group A (PMOPI)	Replace identified damaged water main segments in St. Anthony.	$4,098,827.78	Planning	2019 - Q2	2020 - Q2
RR165	D	RR3 - St. Bernard Group A (VAR)	Replace identified damaged water main segments in St. Bernard Area.	$1,115,298.59	Planning	2018 - Q2	2019 - Q2
RR166	C, D	RR3 - St. Claude Group A (PMOI)	Replace identified damaged water main segments in St. Claude.	$1,908,457.45	Planning	2017 - Q4	2018 - Q4
RR167	C, D	RR3 - St. Claude Group B (PMOI)	Replace identified damaged water main segments in St. Claude.	$644,710.00	Planning	2018 - Q3	2019 - Q3
RR168	C, D	RR3 - St. Claude Group C (FRC)	Replace identified damaged water main segments in St. Claude.	$2,227,242.00	Planning	2018 - Q2	2019 - Q2
RR170	C, D	RR3 - St. Claude Group E (FRC)	Replace identified damaged water main segments in St. Claude.	$1,940,361.00	Planning	2018 - Q3	2019 - Q3
RR180	C, D	RR3 - St. Roch South Group A (PMOI)	Replace identified damaged water main segments in St. Roch.	$2,100,888.70	Planning	2018 - Q4	2019 - Q4
RR181	C, D	RR3 - St. Roch South Group B (FRC)	Replace identified damaged water main segments in St. Roch.	$2,219,453.70	Planning	2018 - Q2	2019 - Q2
RR183	C, D	RR3 - Treme-Lafitte Group B (FRCPP)	Replace identified damaged water main segments in Treme - Lafitte.	$1,896,266.00	Planning	2018 - Q4	2019 - Q4
RR186	E	RR3 - Viavant-Lake Catherine Group C (VAR)	Replace identified damaged water main segments in Viavant.	$3,427,816.04	Planning	2018 - Q3	2019 - Q3
RR188	E	RR3 - Village de L'Est Group B (PMOPC)	Replace identified damaged water main segments in Village de L'Est.	$1,517,969.00	Planning	2018 - Q2	2019 - Q2

Water Sewerage Drainage Combo/Power Joint Project Emergency Repair Note: Joint Projects are part of the Joint Infrastructure Program with the City of New Orleans, with DPW as facilitator

ID	Council District	Name	Scope	Budget	Current Project Phase	Est Start Qtr	Est Complete Qtr
RR189	E	RR3 - Village de L'Est Group C (FRC)	Replace identified damaged water main segments in Village de L'Est.	$2,036,421.00	Planning	2018 - Q4	2019 - Q4
RR194	A	RR3 - West End Group B (FRC)	Replace identified damaged water main segments in West End.	$1,702,714.00	Planning	2018 - Q3	2019 - Q4
S025	A	Network Extensions and replacement of sewer FM	sewer FM replacement on Memphis (from Filmore to Lane St)	$1,700,000.00	Planning	2018 - Q3	2019 - Q3

Water Sewerage Drainage Combo/Power Joint Project Emergency Repair Note: Joint Projects are part of the Joint Infrastructure Program with the City of New Orleans, with DPW as facilitator.

Sewerage and Water Board of New Orleans
Tracking Tool for Commitments to City Council

Status Key | On Target | Not Started | Delayed | Needs Attention

Topic	Commitment	Target Date	Status	Next Steps	Strategic Plan Reference
I. Governance Practices	A. Reduce the length of Board member terms and limiting the number of terms.	October 2013	Completed June 17, 2013. Senate Bill No. 47 reduced the term lengths from 9 to 4 years and limiting members to serving two consecutive terms.	None.	Strategy IV Tactics I.1 and I.2
	B. Establish requisite qualifications for Board members.	October 2013	Completed June 17, 2013. Senate Bill No. 47 requires experience in architecture, environmental quality, finance, accounting, business administration, engineering, law, public health, urban planning, facilities management, public administration, science, construction, business management, consumer or community advocacy, or other pertinent disciplines, with two of the appointments as consumer advocates with community advocacy or consumer protection experience or experience in a related field.	None.	Strategy IV Tactic I.3
	C. Reduce the number of Board members.	October 2013	Completed June 17, 2013. Senate Bill No. 47 reduced the size of the Board from 13 to 11 members.	None.	Strategy IV Tactic I.4
	D. Review function and responsibilities of Board committees.	Not determined.	Completed August 19, 2015. Board of Directors revised Bylaws based upon recommended best practices contained in New Orleans Office of Inspector General Guide for Boards, Commissions, and Public Benefit Corporations.	None	Strategy IV Tactic I.5
	E. Appoint Board members from recommendations submitted by university presidents.	October 2013 original *May 2014 revised*	Completed May 22, 2014. New board members appointed.	None.	Strategy IV Tactic I.6
	F. Establish dedicated independent oversight of Sewerage and Water Board determined by the City Council.	Not determined.	Completed May 30, 2013. Staff presents to Public Works Committee of City Council as scheduled on identified questions and concerns.	None.	Strategy IV Tactic M

Sewerage and Water Board of New Orleans
Tracking Tool for Commitments to City Council

Status Key — On Target | Not Started | Delayed | Needs Attention

Topic	Commitment	Target Date	Status	Next Steps	Strategic Plan Reference
II. Customer Service Improvements	A. Acquire and implement Advanced Metering Infrastructure. Replace existing mechanical meters with new electronic meters and an automated meter reading system that will provide more accurate readings, enhanced leak detection on customer lines, and improved account monitoring. The new meters will be installed for the residential and small commercial customer base.	December 2016 *December 2018 revised*	On target. Pilot demonstration of leak detection and automated shutoff capabilities underway. Readiness Assessment underway to determine next steps. Project will be fully initiated following completion of readiness assessment.	Continue replacement of existing manual-read meters with electronic-read meters. Develop a preliminary implementation plan and issue a request for proposals for change-out of residential and small commercial meters and installation of automated meter reading capabilities. Confirm targeted completion date following readiness assessment.	Strategy III Tactic B
	B. Open Additional Customer Service Center to provide convenient access to full service capabilities for customers without travelling to the downtown location.	December 2013 original *On hold*	On hold, pending review of the overall strategy for office space by the permanent Executive Management Team	Present a plan to Executive Management after new team members are in place.	Strategy III Tactic H
	C. Replace existing billing application with new software that includes online customer account management capabilities.	January 2015 original *October 2016 revised*	On target. Customer Service Management System from Cogsdale Corporation implementation went live on October 24, 2016.	None.	Strategy III Tactic C
	D. Replace existing work order application with new software that includes online work order tracking and appointment scheduling capabilities.	December 2017 - *Still pending for infrastructure work orders*	Completed March 6, 2017 for service orders related to customer accounts. Delayed for work orders related to buried infrastructure.	Next steps to be determined as part of the development of an Information Technology Strategic Plan. Confirm targeted completion date following ITSP development.	Strategy III Tactic D and E Strategy IV Tactic D
	E. Improve efficiency and reliability of Customer Service processes. Reduce the volume of calls by increasing perceived accuracy of bills. Ensure meter reading and billing edits are worked diligently. Improve the customer experience when questioning a bill and resolve more issues during the first call. Provide more effective appeals process.	Ongoing	Previous Customer Service Improvement Plan completed October 31, 2014. New Customer Service Improvement Plan adopted June 17, 2015. Customer service metrics reported monthly to Finance / Administration Committee and Quality of Life Stat meetings.	None.	Strategy III Tactics A, F, and G
III. Service Assurance Program	A. Provide additional funding for bill payment assistance through the Water Help program.	January 2013	Completed January 31, 2013. Funding for bill payment assistance through the Water Help program increased from $60,000 to $240,000. Process with Total Community Action was streamlined.	None.	Strategy III Tactic I.1

Sewerage and Water Board of New Orleans
Tracking Tool for Commitments to City Council

Status Key | On Target | Not Started | Delayed | Needs Attention

Topic	Commitment	Target Date	Status	Next Steps	Strategic Plan Reference
	B. Expand Water Help program to provide assistance with plumbing repairs.	June 2013 original *On hold*	Original initiative completed March 31, 2014. Program provides up to $250 for plumbing repairs on the customer's portion of the service line. However, this program was not successful in providing effective support to low-income elderly and handicapped customers for their plumbing repairs.	Evaluate program to focus support onto replacement of lead service lines.	Strategy III Tactic I.2
	C. Pursue legislative change to allow adjustments for water lost through customer leaks.	March 2013 original *March 2016 revised*	Completed March 16, 2016. R.S. 33:4071(F) authorized Sewerage and Water Board to adopt rules and procedures to adjust water bills. Adjustment policy developed and adopted.	None.	Strategy III Tactic I.3
	D. Evaluate waiver of service charges based on means testing for qualifying low-income elderly and disabled customers.	June 2013	Completed July 17, 2013. Staff recommended that the Board not adopt a waiver of these service charges based on means testing. Recommendations accepted by Board of Directors.	None.	Strategy III Tactic I.4
	E. Evaluate reduction in late payment fee, disconnect fee, returned check fee, and deposits.	March 2013 original *June 2013 revised*	Completed July 17, 2013. Because of the significant revenue loss associated with a reduction in late payment fees and disconnect fees, staff recommended that consideration of changes to these fees be deferred until after the first full year of revenues have been received from the new rates in order to ensure that revenues from the new rates are sufficient to allow for this offsetting reduction in fees while still accomplishing other financial objectives. Revenues from the new rates have not been sufficient to allow reduction in fees.	None.	Strategy III Tactic I.4
IV. Operational Reforms	A. Improve operations through performance measures, improved framework, and follow-up reviews to reduce future rate increases.	December 2017	On target. Training program developed and underway for frontline employees. Performance measures reviewed and developed. Significant savings from improved procurement of goods and services.	Process documentation, analysis, and improvement objectives combined with cost reduction are included in several senior management goals. Document and report improvement results.	Strategy II Tactic D Strategy IV Tactics B and H Strategy IV Tactic M

Sewerage and Water Board of New Orleans
Tracking Tool for Commitments to City Council

Status Key | On Target | Not Started | Delayed | Needs Attention

Topic	Commitment	Target Date	Status	Next Steps	Strategic Plan Reference
	B. Reduce free water and sewer service provided to municipal accounts by fifty percent from a baseline of 2010 usage.	December 2017	On target. Quantity of free service reduced from 2010 to 2015 by 22.0%. School system billing piloted for consumption beginning July 2013. No changes to related laws were initiated for 2015 Louisiana legislative session.	Continue work with property administrators at municipal facilities to identify opportunities for reduced consumption. Coordinate with revenue-producing agencies to pursue legislative relief from burdensome requirements for free service.	Strategy II Tactic F
	C. Improve coordination between Sewerage and Water Board and Department of Public Works.	Not determined.	On target. A joint team of Sewerage and Water Board engineers and Department of Public Works engineers work together in coordination of planning and construction for the FEMA Recovery Roads program.	Determine feasibility of performing street drainage maintenance work on a fee-for-service basis, subject to identification of funding requirements, establishment of a funding stream, and gaining necessary legislative authorizations.	Strategy I Tactics A.1, B.1, and C.4
	D. Improve ratepayer collections.	Not determined.	Completed December 31, 2013. Plans to improve collections have recently focused on ensuring close compliance with schedules for non-payment turn-offs. The amount written off as uncollectable has reduced from 10.23% in 2010 to 1.47% in 2015.	None.	Strategy IV Tactic G
	E. Develop a long-term staff succession and training program.	Not determined.	On target. A partnership between Delgado Community College, the Sewerage and Water Board of New Orleans and the JOB1 Business and Career Solutions Center has launched a worker training program aimed at increasing the pool of certified water and wastewater treatment personnel to meet the anticipated demand for workers to operate the systems. Delgado has applied to become a certification testing site.	In conjunction with the City's JOB1 program and Sewerage and Water Board, Delgado Community College will develop training to increase the pool of certified personnel to meet the needs of the capital improvement program. Knowledge management and succession planning objectives have been added to several senior management goals.	Strategy V Tactic G
	F. Perform annual water audit to measure progress and critical needs.	Ongoing.	Completed September 8, 2015. Water Audits have been performed for 2008 through 2014.	None.	Strategy IV Tactic K
	G. Enhance long range planning by developing a Facilities Plan for 2015-2035.	December 2014	Completed August 4, 2015. Recommendations incorporated into Capital Improvement Plan.	None.	Strategy I Tactic F.1

Sewerage and Water Board of New Orleans
Tracking Tool for Commitments to City Council

Status Key | On Target | Not Started | Delayed | Needs Attention

Topic	Commitment	Target Date	Status	Next Steps	Strategic Plan Reference
	H. Develop new sources of funding other than water and sewer rate increases.	Ongoing.	On target. New revenue stream established for handling wastewater from mobile containers, such as portable toilets and shipping containers.	Analyze opportunities for providing wholesale water service over long distances.	Strategy II Tactic I
	Repay funds owed to Department of Public Works.	December 2016	Completed December 31, 2016.	None.	Strategy II Tactic E
V. Economic Opportunities	A. Create economic opportunities consistent with City of New Orleans programs for participation by economically disadvantaged and local business enterprises.	Not determined.	On target. For contracts with DBE participation 2016: Goods and Services $138,840 or 28%, Construction $13,116,847 or 19%, and Professional Services $1,225,000 or 35%.	Sewerage and Water Board will continue to create economic opportunities for participation by economically disadvantaged and local business enterprises through Construction Review Committee and Staff Contract Review Committee recommendations and DBE vendor support and training.	Strategy IV Tactics F and L
VI. Capital Improvement Program	A. Water System Improvements Replacement and rehabilitation of water purification plant facilities. Replacement and rehabilitation of water pumping facilities. Replacement of water system transmission and distribution mains. $277,000,000	December 2020	On target. 2017 Capital Budget fully funded. Progress on capital projects reported to Board of Directors.	Continue execution of capital improvement program.	Strategy I Tactic A.1 through A.5
	B. Replacement and rehabilitation of sewer system collection pipes required by Federal Consent Decree. $314,000,000	December 2020	On target. 2017 Capital Budget fully funded. Progress on capital projects reported to Board of Directors.	Continue execution of capital improvement program.	Strategy I Tactic B.1 through B.3
VII. WaterStat Reporting and City Council Oversight	A. Establish performance measures and targets as well as reporting methodology.	March 2013	Completed March 31, 2013. Measurements framework adopted, initial measurements identified, and measurements training delivered to senior management. Collection of performance data in progress. Additional graphs created.	None.	Strategy IV Tactics A and B

Sewerage and Water Board of New Orleans
Tracking Tool for Commitments to City Council

Status Key On Target | Not Started | Delayed | Needs Attention

Topic	Commitment	Target Date	Status	Next Steps	Strategic Plan Reference
	B. Implement a systematic approach to process documentation, analysis, and improvement.	June 2013	Completed April 1, 2014. Training program developed and contract for training delivery awarded. Departmental training plans developed in March 2014 and business skills training began in April 2014. Improvement initiatives identified by training participants.	None.	Strategy II Tactic D Strategy IV Tactic H
	C. Perform follow-up reviews to document results and efficiencies achieved.	January 2014 original *December 2014 revised*	Completed September 18, 2015. Louisiana R.S. 33:4091 Reports of Board issued to City Council.	None.	Strategy IV Tactic B
	D. Provide maps showing maintenance work completed, capital projects completed, and planned capital improvements.	January 2013 and Ongoing	Completed January 1, 2013 for printed maps. Online Tool to Track Road Construction Across New Orleans released on March 10, 2015.	None.	Strategy IV Tactic M
	E. Document FEMA receipts and uses of funds.	January 2013 and Ongoing	Completed January 1, 2013. Summary of FEMA receipts and uses of funds is provided to Board committees each month.	None.	Strategy IV Tactic M
	F. Initiate annual meetings with citizens of each council district to regularly report on organizational performance results.	May 2014 original *December 2014 revised*	Completed December 2014. Sewerage and Water Board staff regularly attend meetings in each council district upon request.	None.	Strategy IV Tactic M
	G. Provided written updates to the Clerk of the City Council.	Quarterly and As Requested.	Completed May 30, 2013.	None.	Strategy IV Tactic M

Statistics	
Completed	22
On Target	10
Not Started	0
Delayed	3
Needs Attention	0
Total	**35**