

CITY OF BETHLEHEM

DEPARTMENT OF WATER AND SEWER RESOURCES INTEROFFICE MEMORANDUM

SUBJECT: Water Meters

TO: Public Works Committee
Bethlehem City Council

FROM: Mr. Edward J. Boscola, P.E., Director of Water and Sewer Resources

DATE: March 13, 2024

In preparation for the March 19, 2024 Public Works Committee meeting to discuss water meters, billing and related matters, I can offer the following information on the City's water metering infrastructure, billing practices, and dispute resolution process.

Accurate and reliable water metering is crucial to ensure that customers are being charged fairly and accurately for their individual consumption. We take this responsibility seriously. Our Commercial Operations Bureau is comprised of 11 employees who take care of metering and billing services for approximately 37,000 customers. They are dedicated public servants who do a commendable job to ensure that metering and billing is accurate and that all billing disputes are addressed promptly and fairly in accordance with City Ordinances and the Water Tariff. We strive to resolve all disputes in an amicable manner but it is important to recognize that we must have uniform rules for metering and billing so that the system is fair to all customers.

The evidence presented below shows that our metering and billing systems are fair and accurate and the public can be assured that their water and sewer bills reflect actual consumption as measured by their water meter.

Types of Water Meters

The City currently employs three types of water meters:

- a) Positive Displacement (PD)
- b) Electromagnetic (EM)
- c) Turbine

All are highly reliable and accurate and last for many years with little to no maintenance. PD and EM meters are best for measuring low flow conditions and are used in residential applications. Turbine meters are good for high flow conditions and are used in large commercial and industrial applications.

Positive Displacement (PD) meters are mechanical devices with moving parts. Water displaces a disc or piston as it moves through the meter. Each rotation of the disc passes a finite volume of water. This rotation gets translated through a mechanical or magnetic linkage that turns the meter dial to register the number of gallons that pass through the meter.

Electromagnetic (EM) meters are battery-powered devices with no moving parts. The battery imparts a magnetic field around the flow chamber. Water moving through the chamber induces a voltage which is proportional to the flow rate through the meter. This drives the digital meter readout.

Turbine Meters are used for large commercial and industrial customers and range in size from 3" to 8" in diameter. Water passing through the meter rotates an impeller that measures the flow of water. These meters are best for high flow conditions.

Meter Replacement Project

The last major meter replacement effort in the City occurred in the mid-1990's. All residential meters installed at the time were positive displacement meters mostly manufactured by Rockwell Corp. Touch-pads were also installed which allowed the meter reader to get the reading from the T-pad outside of the house in lieu of a visible read of the meter register.

For the past 10+ years we have been replacing the older PD meters with the newer EM meters. To date, of 37,000 meters in the City system, approximately 21,000 are PD, 14,000 are EM, and 2,000 are Turbine. All Turbine meters have been replaced in the past 7 years.

We began a more aggressive replacement program for the aged PD meters in 2023 with the goal to replace 4,000 per year over the next six years. By 2028, all residential properties will be outfitted with the EM style meters. The City selected the Sensus iPerl as the primary EM meter make/model.

Automatic Meter Reading

Concurrent with the meter replacement project, the City is installing Automated Metering Infrastructure (AMI) that will allow transmission of meter readings via radio frequency units to central receiving towers that transfer the data to the City's billing system. To date, approximately 12,000 customers are on the AMI platform. The goal is to install 4,000 per year in conjunction with the meter replacement project so that by 2028 we should have about 95% of our customers on AMI. The remaining customers will be converted after 2028. This will eventually eliminate the need for the Touch-Pad meter reading operation.

The proposed capital budgets for 2023 through 2028 includes approximately \$2,000,000 per year to replace 4,000 residential meters and install 4,000 RF end-points for the AMI program. The all-in cost to replace 37,000 meters and install 37,000 end-points for AMI is approximately \$15,000,000.

Meter Testing / Billing Disputes

The City's Water Tariff issued by the Public Utility Commission (which governs policy for outside-city customers) and City Ordinance Article 911 (which governs policy for inside-city customers), contain identical language on how to address billing disputes and meter testing.

Customers can file a dispute with our billing office and request a test of their water meter should they believe their bill to be in error. The Tariff and Ordinance include remedies for billing adjustment should the meter be found to be:

- a) fast, i.e. over-reporting
- b) slow, i.e. under-reporting
- c) stopped

If the meter is found to be accurate the customer is charged a \$38 test fee; otherwise, their billing gets adjusted as appropriate if the meter is determined to be inaccurate.

Since 2015, there have been 28 formal requests from customers to test their water meter due to a potential disputed bill. An average of about 3 per year. All 28 meters tested 100% accurate. Keep in mind we mail approximately 160,000 water and sewer bills annually. The number of contested bills is miniscule compared to the overall number.

The meter shop also tests many meters that are routinely replaced to check the overall accuracy of our meter stock. Since 2015, we have tested approximately 2,000 meters, mostly the older PD style. Of that sample, 97% tested accurate, 3% tested as slow or stopped, 0% tested fast. As a general practice we do not back charge customers who have been found to have slow or stopped meters as these are mostly ones that are due to be replaced.

The common failure mode for the old PD style meters is that they stop. The internal moving parts wear out or get jammed and the meter stops turning. There have been 650 stopped meters identified and replaced over the past 10 years. There is no evidence to suggest meters somehow speed up or run fast or measure more flow than actually passes through the meter. Also, there have been no identified problems with the new EM style meters to date, either mechanical or electronic. There is no evidence of any electronic failures with respect to the transfer of data from the meter to the billing database.

The Water Tariff and Ordinance (Article 911.08) state with respect to water billing adjustments: "No adjustment of amount registered is permitted for any reason except malfunction of meter, or upon a positive showing by the customer in instances of excessive usage that the usage resulted from circumstances beyond his ability to control."

The City's Sewer Ordinance (Article 927) allows for an accommodation for a credit against sewer bills if the customer can show that excessive water usage did not enter the sanitary sewer system.

High Usage Notification

For customers that still have the old-style PD meters that get read once per quarter, we run reports every billing cycle to identify customers with usage that is 50% above their quarterly average. We contact those customers to alert them of a potential problem. The downside with this is that the notification of high usage occurs after the fact.

For customers on the new AMI platform, the system collects meter data every hour. It is programmed to generate a "continuous flow" alarm if flow remains unusually high for long periods of time. For residential customers this is set at 3,000 gallons per day. We check for these alarms daily. This allows for a timely notification of customers so they can check their water usage promptly.

We average approximately 10 to 20 high usage notifications per month. Customers have generally responded positively after being notified of possible excessive usage.

Case Studies

Below are a few recent examples of customers who have experienced unusually high usage. Note the following volumetric calculation. For a 1 gallon per minute leak, if left unaddressed this would result in:

1,440 gallons per day
10,080 gallons per week
302,400 gallons per month

Customer A

Average quarterly usage was consistently around 8,000 gallons per quarter for several years. In the 3rd quarter of 2023 usage peaked at 48,000 gallons, an increase of 40,000 gallons over average. The customer identified a running toilet left unattended. Upon corrective action their usage returned to normal in the 4th quarter. Customer was responsible for water and sewer bill for the excessive usage.

Customer B

Average quarterly usage was around 20,000 gallons per quarter. 3rd quarter of 2023 usage peaked at 92,000 gallons, an increase of 72,000 gallons over average. The customer identified a leak in their lawn irrigation system. A sewer credit was applied since the lost water did not enter the sanitary sewer system. The customer was still responsible for the water usage. Usage returned to normal in the 4th quarter.

Customer C

Average quarterly usage was around 10,000 gallons per quarter. 2nd quarter of 2023 usage peaked at 227,000 gallons, an increase of 217,000 gallons over average. The customer identified a leak in a plumbing line in an unfinished crawl space. A sewer credit was applied since the lost water did not enter the sewer system. The customer was responsible for the water usage. Usage returned to normal in the 3rd quarter.

Respectfully submitted.



Copy: J. William Reynolds, Mayor
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