
WATER METER AUDIT PHASE 1

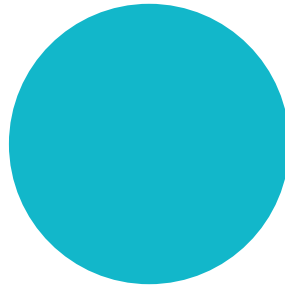
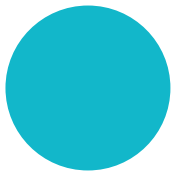
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December 19, 2019

*The Honorable Mayor, Board of Directors, and Audit Committee
Members*

*City of Fort Smith
623 Garrison Avenue
Fort Smith, AR 72901*

The Internal Audit Office contracted with Vanessa M. Johnson, CPA, LLC (VMJ CPA) to provide professional independent internal audit services. We have assisted the Internal Audit Director in performing Phase 1 of the Water Meter Audit and have issued a report dated December 19, 2019.

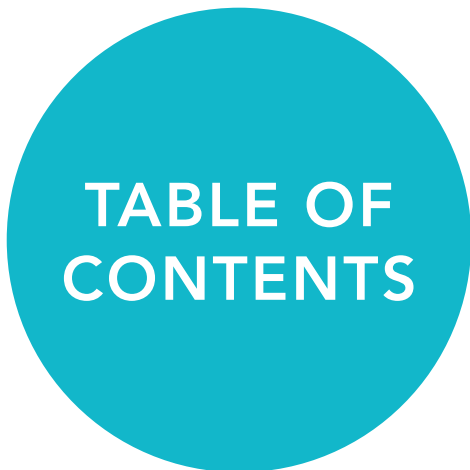
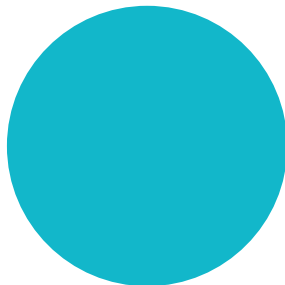
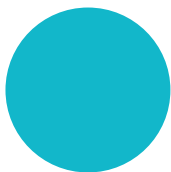
The scope of our work constituted the review of activities and transactions related to the Water Meter Testing and Maintenance Program and did not constitute an evaluation of the overall internal control structure of the Utility Department.

The attached audit report identifies two (2) opportunities for the Utility Department to improve the effectiveness and efficiency of operations.

We would like to express our appreciation to management and staff of the Utility Department for their time and effort, responsiveness, and cooperation during the course of the audit.

Thanks,

Vanessa M. Johnson, MBA, CPA, CIA
Managing Director

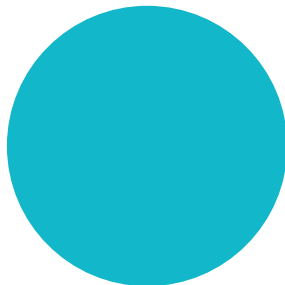
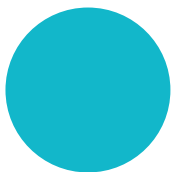


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EXECUTIVE SUMMARY

INTRODUCTION

In early 2019, the customer service center for the Utilities Department received an increased number of calls related to unusually high water bills. This prompted a water meter process review to address customer concerns. The City of Fort Smith's Internal Audit Department engaged VMJ CPA to assist in conducting a Water Meter Audit within the City's Utilities Department. The internal audit is divided into four phases:

PHASE I: Water Meter Calibration and Maintenance

PHASE II: Water Meter Inventory

PHASE III: Meter Reading Billing and Collection Process, and

PHASE IV: Information Technology

This audit report issued on 12/19/2019 outlines the findings and recommendations for Phase I of the Water Meter Audit.

BACKGROUND

Over 24 million gallons of water a day is managed by the City's Utilities Department and accounts for approximately \$50 million in revenue annually . In January 2018, the City of Fort Smith issued a bid advertisement for new meters and commenced a multi-year project to replace old water meters with new Electronic Read Transmitters (ERT) and positive displacement meters to improve the efficiency and effectiveness of the meter reading process. The new ERT'd water meters allow for the automated capture of water reads versus field technicians manually reading water meters. Zenner Performance Meters won the bid for the project having the lowest bid of \$1,222,503. Resolution R-21-18 was adopted on February 6, 2018 accepting the bid. Itron, Inc. was the vendor selected to purchase the ERTs in the amount of \$1,325,725.13. The Zenner meters' calibration results are shown on a label affixed to the meter.

Phase I of the Water Meter Audit reviews the City's Water Meter Testing and Maintenance Program to determine if water meters are properly calibrated and maintained according to the standards published by the American Water Works Association (AWWA). The AWWA standards provides established guidelines on the Selection, Installation, Testing, and Maintenance of water meters.

AUDIT SCOPE AND OBJECTIVES

The engagement scope considered activities and transactions related to the Water Meter Testing and Maintenance Program.

Our audit objective, as refined during research and the risk assessment process occurring throughout the course of our work, is as follows:

1. To determine if meters are properly calibrated prior to installation and maintained to ensure the water flow measurements are accurately captured.

PROCEDURES PERFORMED

To obtain sufficient evidence to achieve audit objectives and support our conclusions, we performed the following:

PLANNING

- Conducted kick-off meeting with Internal Audit and Utility Management;
- Developed and submitted an initial data request to obtain standard operating procedures (SOPs), processes and control documentation, performance metrics, bid documentation for meter purchases, and other relevant data that was reviewed to perform assessments;
- Conducted interviews and process walkthroughs with key individuals managing the Water Meter Testing and Maintenance Program.
- Identified key risks and controls and evaluated design of controls;
- Identified potential areas for process improvements and control gaps;
- Refined work plan based on risks, standards, and processes, and developed test plans; and
- Performed sampling of meters and issued data request for detailed testing.

FIELDWORK

- Performed independent water meter testing on sampled meters to determine if meters were calibrated according to AWWA standards.
- Examined test results of sampled meters to determine if meters are periodically testing as part of the City's Water Meter Testing and Maintenance Program.
- Documented findings and confirmed with process owners

REPORTING

- Prepared a draft report to include testing results and recommendations
- Discussed draft findings with process owners and management, obtained management responses, and assessed management responses.

AUDIT METHODOLOGY

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards and in conformance with the International Standards for the Practice of Internal Auditing as promulgated by the Institute of Internal Auditors. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives.

The scope of our work did not constitute an evaluation of the overall internal control structure of the Utility Department. Management is responsible for establishing and maintaining a system of internal controls to ensure that City assets are safeguarded; financial activity is accurately reported and reliable; and management and employees are in compliance with laws, regulations, and policies and procedures. The objectives are to provide management with reasonable, but not absolute assurance that the controls are in place and effective.

CONCLUSIONS AND SIGNIFICANT ISSUES

We believe that we have obtained sufficient and appropriate evidence to adequately support the conclusions provided below as required by professional auditing standards. Each conclusion is aligned with the related Audit Objective for consistency and reference. For detailed findings, recommendations, management responses, comments and assessment of responses see the "Detailed Findings, Recommendations, Management Responses, and Assessment of Responses" section of this report.

AUDIT OBJECTIVE 1

To determine if meters are properly calibrated prior to installation and maintained to ensure the water flow measurements are accurately captured.

CONCLUSION

Based on the results of the audit procedures performed, the audit team noted that the Utility Department should develop processes and improve internal controls of its Water Meter Testing and Maintenance Program to ensure meters are properly calibrated prior to installation at a service address, and meters are properly maintained throughout its useful life according to AWWA standards.

- **Water Meter Testing Equipment Calibration** - The testing bench equipment used for testing water meters by the Utilities Department has not been calibrated in over 10 years. There was no documentation to show where the testing bench had been calibrated since it was purchased over 30 years ago. (See Finding #1)
- **Water Meter Periodic Testing and Maintenance** – Water meters are not tested periodically as outlined by the AWWA to ensure meters are accurately capturing water flow measurements. (See Finding #2)

OTHER OBSERVATIONS

- In January 2018, bids were solicited by the City Utilities Department to purchase new water meters. The lowest and acceptable bid was from Zenner Performance Meters of Addison in the amount of \$1,222,503. Because of the nature and extent of solicitation made, accepting the lowest bid may not always be in the best interest of the City. Based on testing procedures performed and interviews with experienced technicians, the quality and performance of other brands of meters should have been considered not only based on price, but the quality, accuracy rate, and useful life the City would benefit from by purchasing a meter that may have been more expensive than the lowest bidder.
- During testing, audit noted that calibration labels from Zenner were placed on the wrong meters. The labels identify the meter number and what the calibration number was for high, medium, and low flow. The calibration numbers would be reviewed and compared to the calibrated numbers when tested by the City. An analysis would not produce the right information if the City did not identify those meters labeled wrong by Zenner.
- During testing, audit noted that a 5/8" meter top was placed on a 2" meter. If the City was not able to identify those meters with the incorrect meter top before the meter was installed, then the City would lose revenue because the flow of water would not register correctly.

ACKNOWLEDGEMENT AND SIGNATURES

The Audit Team would like to thank the Utility Department for their cooperation, time, and efforts throughout the course of the engagement.

Vanessa Johnson

Vanessa M. Johnson, MBA, CPA, CIA
Managing Director

Tracey Shockley, CFE, CCA
City of Fort Smith Internal Audit Director

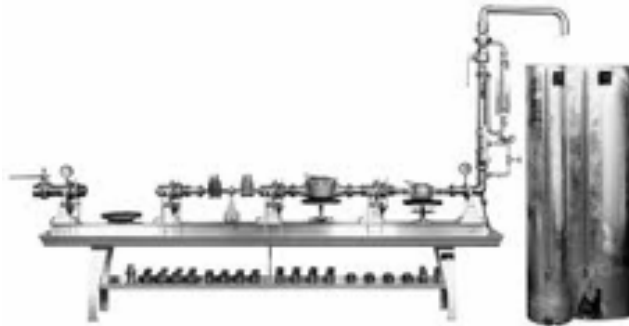
DETAILED FINDINGS,
RECOMMENDATIONS,
MANAGEMENT RESPONSES,
AND ASSESSMENT OF
RESPONSES

FINDING # 1

WATER METER TESTING EQUIPMENT NOT CALIBRATED

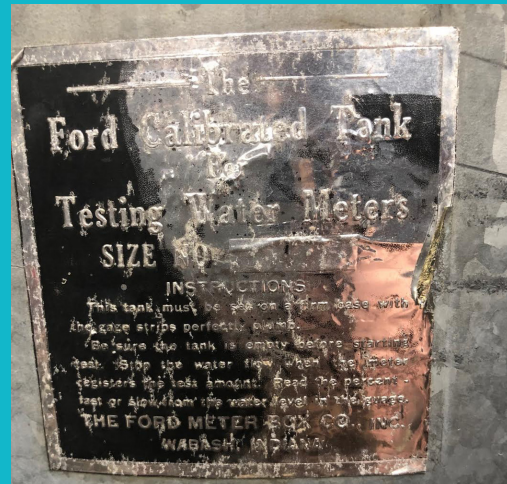
BACKGROUND

The City of Fort Smith Utilities Department purchased the Ford Water Meter Testing Bench over 30 years ago to perform testing of its water meters. The test bench can test 4 water meters at a time. The test bench can only test 5/8" and 3/4" water meters.



FINDING 1

The testing bench equipment used for testing water meters is currently not calibrated. In addition, the test bench is over 30 years old, and requires a very manual method of testing, which has inherent risk for human error. The tank is filled to a marker that has been designated by the technician as being at a sufficient amount of water to perform testing on the bench of the water meters. Since the machine is not calibrated, the accuracy of the test performed cannot be validated. It also does not generate any testing reports. Only manually prepared reports are provided to show testing results. An uncalibrated testing equipment can lead to unreliable test results.



RECOMMENDATIONS

We recommend the City invest in a newer testing bench that allows for testing of all meter types and sizes maintained in the City's water meter inventory. In addition, the newer testing bench should have features of systematic reports to show testing results and calibration of flow rates. Water meter accuracy is critical to the operation of Utilities as revenue to the City is impacted.

FINDING # 1 (CONT.)

WATER METER TESTING EQUIPMENT NOT CALIBRATED

UTILITIES DEPARTMENT'S MANAGEMENT RESPONSE:

The Utility Department agrees with the finding of the inadequacy of the current water meter testing equipment. The Department also agrees fully that the current "manual" testing procedure allows for errors, experimenter bias, and the lack of automated documentation is a risk for human error and is less than an auditable system.

The Department has requested funds in the 2020 budget to purchase a new, computer automated, calibratable water meter test bench. This test bench will be able to test meters from 5/8 inch to 2 inch meters. This request is found in the additional needs/requests portion of the budget that the Board of Directors will need to approve for the funds to be available. Should the Board of Directors not pass this section of the 2020 budget, the Utility Department will request funds from the unobligated funds to purchase the aforementioned water meter test bench.

RESPONSIBLE PARTY:

Lance McAvoy, Interim Utility Director

ESTIMATED DATE OF COMPLETION:

The date of the purchase and installation will be dependent on funding for the equipment. If funded by the end of January 2020, staff hopes to have the new test bench ordered before the end of March 2020. Delivery, installation, calibration and training on the new equipment should be completed no later than July 2020. This is based on 60 to 90 day lead time for delivery, set-up, calibration, and training by the manufacturer. The importance of this will make this a top priority for 2020.

ASSESSMENT OF RESPONSE*:

Management's response, as presented, sufficiently addresses the issues identified and corrective actions are appropriate.

*ALL SUPPORTING DOCUMENTATION RELATED TO THE DETAILED AUDIT FINDINGS CAN BE REQUESTED TO THE CITY'S INTERNAL AUDIT DIRECTOR.

FINDING # 2

WATER METERS ARE NOT TESTED PERIODICALLY

BACKGROUND:

Currently, the Utilities Department does not have a Water Meter Testing and Maintenance Program. However, the operational practice of the department for testing water meters is when customers have complaints about their meter readings or when meters are taken out of service to determine if the meters will be scrapped. From the individual customer's viewpoint, meters should be tested to protect the customer against meter inaccuracy that could result in overcharges from over-registration. This matter is also of concern to utility management. Experience shows, however, that the greater concern of a water utility should be the inequities and revenue loss that result from under-registration of meters. There are approximately 30,972 active water meters that generates approximately \$50 million in revenue annually. The documentation for meter testing results was provided for 27 months, covering January 2017 – April 2019.

FINDING 2:

There is no Water Meter Testing and Maintenance Program in place to test water meters periodically. According to AWWA standards, all new meters should be tested for accuracy of registration at flow rates and test-flow quantities before they are placed in service. The testing bench equipment used for testing water meters can only test 5/8" and 3/4" size meters. The remaining larger meter sizes used by the City, which includes 1" and above, cannot be tested at all on the testing equipment prior to installation. There are 4,815 meters that are 1" and greater, which accounts for 13% of all water meters. IA sampled fifteen (15) 1" and greater for testing and concluded that 5 of 15 meters failed the independent testing in accordance with AWWA standards.

Water meters should also be tested on an on-going frequency based on the guidelines outlined in the AWWA standards, which states that ninety-five percent (95%) of the meters scheduled for tests on a periodic basis are actually tested. During the audit, IA obtained documentation of meter test results from 2017 – 2019 that reported 1,377 meters over the course of 27 months, which is 3% of the population of meters. Furthermore, AWWA standards state that at least ninety-five percent (95%) of the meters actually tested must register results within the accuracy limits shown for both normal and minimum test-flow rates. IA noted that of the 1,377 meters tested by Utilities over the 27-month period, 72% of the meters failed using their uncalibrated test bench equipment.

FINDING # 2 (CONT.)

WATER METERS ARE NOT TESTED PERIODICALLY



RECOMMENDATIONS:

We recommend that all water meters in service are tested periodically according to AWWA guidelines. Management should design and implement a reasonable and effective periodic test plan to test the accuracy of active water meters. Testing records should also be documented and maintained.

FINDING # 2 (CONT.)

WATER METERS ARE NOT TESTED PERIODICALLY

UTILITIES DEPARTMENT'S MANAGEMENT RESPONSE:

The Utility Department agrees a Water Meter Testing and Maintenance Program needs to be developed based on the AWWA Manual M6, Fifth Edition and also incorporate the November 2018 addendum. This includes the required flow rates, test volumes, and allowable accuracy limits for maximum, intermediate and minimum flow rates based on the water meter size.

The Utility Department is looking to purchase a new water meter test bench which will allow testing water meter sizes from 5/8 inch to 2 inch. This would account for the majority of the meters with the exception of 3 inch and larger. For those meters, staff will investigate the possibility of utilizing field meter verification.

Additionally, new meters will be lot tested at a rate of 10% before any of the meters are installed. The City specification for water meters purchased for use in the system require the vendor's meters to comply with AWWA C-700 Standard. This standard requires all meters to be tested and the certification and test results to be provided for each meter by referenced serial number.

An item noticed during the review of the Phase I of the audit was the issue of new meters' original test results being recorded. Once new meter installation is resumed, the meter testing result supplied with the meter will be recorded with that meter's serial number. This will be placed in an electronic record so that future test results may be compared against the original test results supplied by the manufacturer.

To complete the task of establishing a proper Water Meter Testing and Maintenance Program a new test bench must be purchased, installed, calibrated, and staff trained on the proper testing procedure. Records of when each lot was installed or locations of installation of meters by time frames will need to be established to determine which meters will be tested. AWWA Standard recommends 5% of meters installed for a particular year be tested regardless of the total population size. A written protocol will be established and will be utilized in conjunction with a written SOP to determine the meters' acceptable performance, and the results of that performance not being met.

RESPONSIBLE PARTY:

McAvoy, Utilities Director

ESTIMATED DATE OF COMPLETION:

It is hope to be completed no later than December 31, 2020 and implementation of the program to begin on January 2, 2021.

ASSESSMENT OF RESPONSE*:

Management's response, as presented, sufficiently addresses the issues identified and corrective actions are appropriate.

*ALL SUPPORTING DOCUMENTATION RELATED TO THE DETAILED AUDIT FINDINGS CAN BE REQUESTED TO THE CITY'S INTERNAL AUDIT DIRECTOR.

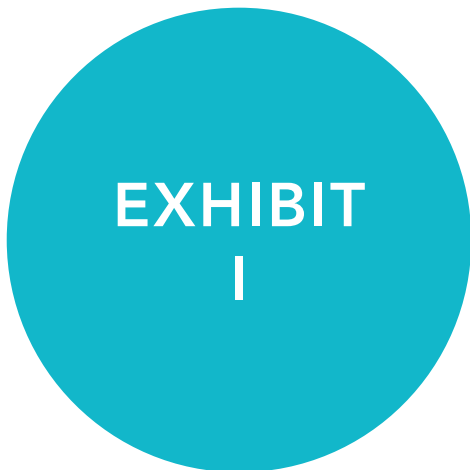
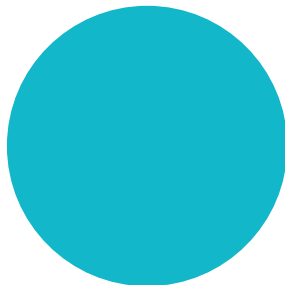
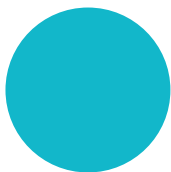
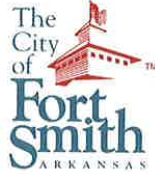


EXHIBIT
I

EXHIBIT I

ACKNOWLEDGEMENT STATEMENT & OFFICIAL MANAGEMENT RESPONSES



Acknowledgment Statement

December 17, 2019

SUBJECT: PHASE I WATER METER AUDIT - WATER METER CALIBRATION AND MAINTENANCE

I acknowledge that the management responses contained in the above referenced report are those of the Utility Department. I also understand that this document will become a part of the final audit report that will be posted on the Internal Audit's website.

Sincerely,

A handwritten signature in blue ink, appearing to read "Lance McAvoy".

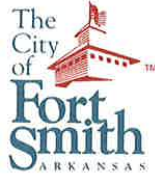
Lance McAvoy
Utility Department

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EXHIBIT I

ACKNOWLEDGEMENT STATEMENT & OFFICIAL MANAGEMENT RESPONSES



Finding #1 – Water Meter Testing Equipment Not Calibrated

Utility Department's Management Response:

The Utility Department agrees with the finding of the inadequacy of the current water meter testing equipment. The Department also agrees fully that the current "manual" testing procedure allows for errors, experimenter bias, and the lack of automated documentation is a risk for human error and is less than an auditable system.

The Department has requested funds in the 2020 budget to purchase a new, computer automated, calibratable water meter test bench. This test bench will be able to test meters from 5/8 inch to 2 inch meters. Larger meter test bench cannot be utilized as there is not enough space at the Kelley Highway facility to accommodate a test bench capable of testing larger meters. This request is found in the additional needs/requests portion of the budget that the Board of Directors will need to approve for the funds to be available. Should the Board of Directors not pass this section of the 2020 budget, the Utility Department will request funds from the unobligated funds to purchase the aforementioned water meter test bench.

Responsible Party:

Lance McAvoy, Utility Director

Implementation Date:

The date of the purchase and installation will be dependent on funding for the equipment. If funded by the end of January 2020, staff hopes to have the new test bench ordered before the end of March 2020. Delivery, installation, calibration and training on the new equipment should be completed no later than July 2020. This is based on 60 to 90 day lead time for delivery, set-up, calibration, and training by the manufacturer. The importance of this will make this a top priority for 2020.

Finding #2 – Water Meters Are Not Tested Periodically

Utility Department's Management Response:

The Utility Department agrees a Water Meter Testing and Maintenance Program needs to be developed based on the AWWA Manual M6, Fifth Edition and also incorporate the November 2018 addendum. This includes the required flow rates, test volumes, and allowable accuracy limits for maximum, intermediate and minimum flow rates based on the water meter size.

The Utility Department is looking to purchase a new water meter test bench which will allow testing water meter sizes from 5/8 inch to 2 inch. This would account for the majority of the meters with the exception of 3 inch and larger. For those meters, staff will investigate the possibility of utilizing field meter verification.

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ACKNOWLEDGEMENT STATEMENT & OFFICIAL MANAGEMENT RESPONSES

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To complete the task of establishing a proper Water Meter Testing and Maintenance Program a new test bench must be purchased, installed, calibrated, and staff trained on the proper testing procedure. Records of when each lot was installed or locations of installation of meters by time frames will need to be established to determine which meters will be tested. AWWA Standard recommends 5% of meters installed for a particular year be tested regardless of the total population size. A written protocol will be established and will be utilized in conjunction with a written SOP to determine the meters' acceptable performance, and the results of that performance not being met.

Responsible Party:
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