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# **Water Revenue Capture Review**

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**Date:** August 31, 2011

**To:** Steve Kotke, Director of Public Works, Public Works Management Services

**Re:** Water Revenue Capture Review

The Internal Audit Department (IA) conducted a review of City water revenue capture. This review was included in the 2011 Internal Audit Plan, and was completed in July 2011.

### **Background**

Minneapolis Department of Public Works - Division of Water Treatment and Distribution (PWWTD) provides water to the City of Minneapolis and surrounding suburbs. In 2010, total water revenue was approximately \$66 million. This year through June, PWWTD has supplied over 7 billion gallons of water to customers. For 2010, there was an estimated variance between water production and water usage that amounted to approximately 15.75%. The United States Environmental Protection Agency estimates most water utilities lose between 10% - 15% of water in the system.<sup>1</sup> The City hired a new Director of PWWTD to improve efficiencies in water revenue processes, such as meter maintenance and revenue collection.

PWWTD management hired CDM consultants<sup>2</sup> to assist with the assessment of water revenue collection and maintenance of service meter initiatives. CDM looked at meter processing and meter maintenance to find ways to make the processes more effective.

PWWTD currently has 98,239 customer meters. The meter sizes run from 5/8 inch to 16 inches. The clientele ranges from residential, industrial, irrigation to wholesale. CDM analyzed the meters to determine if they were correctly reading water usage, if there was any backlog of meters in need of repair, and the cost of turning water service on/off.

CDM presented a list of recommendations on changes that could improve meter processes and revenue collection. In Appendix A of this report, IA included 9 of the 16 recommendations along with management action plans provided by CDM that closely relate to the scope and objectives of this review.

### **Objectives**

The review was performed to assess whether controls are adequate to ensure:

- All water consumption is accounted for;
- Water charges are completely, accurately and timely captured;
- Customers are billed timely and accurately for water used; and
- Collection is made in a timely manner.

### **Scope**

This review included gaining an understanding of internal controls, including current policies and procedures, through observation, inquiry, and limited testing surrounding the processes listed above.

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<sup>1</sup> *'Control and Mitigation of Drinking Water Losses in Distribution Systems' USEPA 2010.*

<sup>2</sup> CDM offers consulting, engineering, construction and operations services across the project life cycle in water, environment, transportation, and energy fields.

We performed, on a sample basis, testing of the following processes and transactions within the period January 1, 2010 to through June 30, 2011.

- Utility usage tracking (meter reading quality assurance, meter testing and replacement, usage exceptions reporting, and work order system). This work was completed by CDM;
- Billing management and financial reporting for water revenue, to include:
  - billing accuracy,
  - segregation of duties,
  - billing system adjustments,
  - refunds, and
  - management monitoring;
- Water accounts receivable and adjustments; and
- Systems and data analyses related to water revenue.

### **Summary of Findings and Management Action Plans:**

#### **1. Utility Billing Water Accounts Receivable**

##### Utility Billing Water Accounts Receivable Reconciliations

While the Finance Department provided the June 2011 monthly Utility Billing water accounts receivable reconciliation between the general ledger and the accounts receivable ledger, the monthly reconciliations were not prepared in a timely manner.

*As of July 2011, the Enquesta Receivables account in the Water Fund will be reconciled within 30 days of the period end close.*

##### Revenue Accruals

One reconciling item related to revenue accruals for December 2010 has not been reversed, as the water revenue accruals takes place only at year end.

*For 2011, the annual accrual reversal and accrual will be done as it has been historically in Period 12. Beginning in January 2012, revenue accruals and the related reversals will be made on a monthly basis to more accurately reflect the actual revenues earned month to month.*

#### **2. Adjustments and Refunds**

While adjustments and refunds were legitimate for the sample selected, there was no evidence of supervisory review and approval for the sample adjustments greater than \$1,000 and the sample refunds over \$500.

*The current utility billing system does not have automatic on-line approval functionality for adjustments or refunds. Therefore, procedures will be established to comply with the IA recommendation.*

#### **3. Raw Water Production Meters**

Four raw water meters that measure all water produced by the City were found to be inaccurate. Additionally, the City meters the water inflow through the raw water production meters but does not meter the total water outflow into the City's distribution grid.

*The first item, calibration of all raw water production meters, is straight forward and already being implemented. As for the second item, in-plant and finished water meters, our system is fairly complex and atypical with regard to in-plant and finished water metering. As such, this system requires evaluation and analysis in order for meaningful information to be obtained. A plan for improvements was developed and will allow for finished water metering to be used in a meaningful way by December 2012.*

#### **4. Un-Metered Water Usage**

There are nine un-metered areas which potentially account for a portion of the unaccounted for variance.

*PWWTD will assess the feasibility of the nine un-metered areas.*

**Conclusion**

Based on our review, we believe there are opportunities for improvements that address risk areas identified in this report. PWWTD and Finance management worked collaboratively with IA to develop action plans that effectively address these risk exposures.

IA would like to extend our appreciation to the PWWTD and Finance personnel who assisted and cooperated with us during the review.

**cc:** Marie Asgian, Senior Professional Engineer  
Matt Brink, Public Works Financial Analyst  
Bernie Bullert, Director of Water Treatment and Distribution  
Chris Catlin, Public Works Operations Manager  
Robert Ervin, Principle Professional Engineer  
Heidi Hamilton, Deputy Director of Public Works  
Danette McCulley, Accountant II, Minneapolis Finance Department  
Ray Morales, Treasury Operations Manager  
Shahin Rezania, Public Works Engineering and Maintenance Manager  
LeaAnn Stagg, Interim Controller, Finance

# Water Revenue Capture Review

## Audit Findings and Action Plans

### 1. Utility Billing Water Accounts Receivable

Based on IA testing, two areas of improvement were identified within the Utility Billing Water Accounts Receivable process review: Utility Billing Water Accounts Receivable Reconciliations and Revenue Accruals.

#### Utility Billing Water Accounts Receivable Reconciliations

While the Finance Department provided the June 2011 monthly Utility Billing water accounts receivable reconciliation between the general ledger and the accounts receivable ledger, the monthly reconciliations were not prepared in a timely manner. IA acknowledges that the responsible accounting manager made time to prepare the reconciliation when the information was requested.

In the June 2011 Utility Billing water accounts receivable reconciliation, there were some outstanding items that should have been resolved prior to June. Also, the completed Utility Billing water accounts receivable reconciliations were not signed or dated upon completion as evidence of supervisory review. Reconciliations are essential to ensure accuracy, completeness and timely detection of errors. Lack of timely reconciliations may have an impact on the accuracy of the City's financial statements. Good business practices require completion and review of account reconciliations in a timely manner.

Additionally, there are no written procedures in place to mandate a specific completion date for the Utility Billing water accounts receivable reconciliations or require evidence for the review process. Written procedures are a valuable tool used to provide guidance to employees and set employee expectations.

#### Revenue Accruals

One reconciling item is related to revenue accruals for December 2010 that has not been reversed, as the water revenue accruals takes place only at year end. Leaving the accruals unreversed may overstate the City's revenue. Accruals and reversal of accruals should occur on a monthly basis to maintain accuracy of the City's monthly financial statements.

The Generally Acceptable Accounting Principles (GAAP) require entities to record revenue and related expenses in the same period that they occur.

#### **Recommendation**

IA recommends that Finance management develops procedures regarding the timeframe in which monthly Utility Billing water accounts receivable reconciliations should be completed and reviewed by appropriate individuals. IA also recommends that Finance management ensures that these reconciliations are completed and reviewed properly and in a timely manner. Last, IA recommends that Finance management assess the feasibility of accruing revenue on a monthly basis to ensure accuracy of monthly financial statements.

#### **Management Action Plan:**

As of July 2011, the Enquesta Receivables account in the Water Fund will be reconciled within 30 days of the period end close. For 2011, the annual accrual reversal and accrual will be done as it has been historically in Period 12. Beginning in January 2012, revenue accruals and the related reversals will be made on a monthly basis to more accurately reflect the actual revenues earned month to month.

Responsible Party

Danette McCulley, Accountant II, Minneapolis Finance Department

Expected Completion Date

Completed for Accounts receivable reconciliation  
January 31, 2012 for Revenue accruals

**2. Adjustments and Refunds**

According to Utility Billing policies and procedures, any adjustment performed in an amount greater than \$1,000 requires supervisory review and approval. Also, any refund greater than \$500 must be authorized by a supervisor on the refund voucher prior to forwarding the voucher to accounting for refund processing. While IA testing revealed the adjustments and refunds were legitimate for the sample selected, there was no evidence of supervisory review and approval for the sample adjustments greater than \$1,000 and the sample refunds over \$500.

Documented management or supervisor approval of refunds and adjustments provides evidence of supervisory review and assurance that adjustments and/or refunds are legitimate. It also decreases the risk of error and misappropriation.

**Recommendation**

IA recommends Utility Billing management assess the feasibility of enhancing the accounts receivable system to automate supervisory authorization and approval. If this is infeasible, IA recommends Utility Billing management train supervisors on the importance of documenting supervisory approval. Also, to ensure the effectiveness of the refund and adjustment authorizations processes, IA recommends Utility Billing management periodically test a sample of refunds and adjustments to ensure the adequacy of supervisory approval documentation.

**Management Action Plan:**

The current utility billing system does not have automatic on-line approval functionality for adjustments or refunds. Therefore, the following procedures will be established to comply with the IA recommendation.

*Adjustments* – an adjustment of \$1,000 or more must be submitted to a supervisor for approval before it is entered into the billing system. Upon approval, the supervisor will note the account in the billing system that approval has been granted and notify staff to enter the adjustment in the billing system. Approval can be completed by either e-mail or in written form. Approvals will be stored in the Utility Billing document imaging system.

*Refunds* – a refund amount of \$500.00 or more must be approved by a supervisor before it is submitted to accounting for processing. Staff will present the hard copy refund voucher to a supervisor for a signature. Once signed the voucher will be submitted to accounting staff for processing and stored for future reference.

*Validation* – quarterly reports will be created to validate that approvals for both scenarios stated above have been documented and stored according to procedures. These reports will be signed by a supervisor and stored in the Utility Billing document imaging system.

Responsible Party

Ray Morales, Treasury Operations Manager

Expected Completion Date

September 19, 2011

### 3. Raw Water Production Meters

During this review, PWWTD management informed IA that the four raw water meters that measure all water produced by the City were found to be inaccurate. The two raw water production meters that measure approximately 90% of the City's water production have been calibrated this year. They were found to be inaccurately reading water production rates at slightly greater than 3% of actual water flow rates. IA acknowledges that the PWWTD Director and his team conducted this recalibration and noted the inaccurate reading.

PWWTD management will test the last two raw water production meters later this year. Accurate readings from these four raw water production meters are essential to understanding the quantity of water produced by the City.

Also, currently the City meters the water inflow through the raw water production meters but does not meter the total water outflow into the City's distribution grid. Between water inflow and outflow various treatment processes (filtration, backwashing, etc.) take place causing water production losses. Equipping each distribution pump with a discharge meter would aid the City in pinpointing the amount of water used for plant water treatment processes. It would also aid the City in more accurately measuring the amount of water delivered to the system leading to more accurate billing calculations and sales information.

#### Recommendation

IA supports PWWTD efforts in addressing the meter issues. IA recommends that PWWTD management continue their efforts to complete the calibration of all raw water production meters. Also, IA recommends PWWTD management develop a practice of periodically calibrating these meters according to industry leading practices.

Additionally, IA recommends that, in accordance with best practices, PWWTD use duplicate metering in the water production process. IA suggests the use of additional water pump discharge meters on each of the City's production lines connected to the distribution system to more accurately measure water outflow to the City's distribution grid.

#### Management Action Plan:

*Raw Water Meter Calibration* – The first item, calibration of all raw water production meters, is straight forward and already being implemented. The raw water flow meter accuracy will be tested on an annual basis at two typical flow rates. Following the test, the instrument will be calibrated towards a goal of +/- 1% of full scale flow – the industry standard for this type of flow meter.

The raw water meters are our primary measuring device for our current water balance. These meters are used with a few other flows to calculate finished water production. As we assess and improve finished water flow metering, we will have better methods for determining finished water production (see next item).

*In-Plant and Finished Water Meters* – Our system is fairly complex and atypical with regard to in-plant and finished water metering. As such, this system requires evaluation and analysis in order for meaningful information to be obtained. The plan for improvements is as follows:

#### Phase I (September 2011 through December 2011)

- Collect information on in-plant and finished water metering – size, style, model numbers, calibration records, etc
- Produce a flow schematic and spreadsheet for determining in-plant uses and total finished water production – a water balance
- Determine “drawdown” type meter testing plans for each meter

- Determine if additional metering is required or if additional valving is required (check valves, for instance to direct flows past meters)

Phase II (*December 2011 through May 2012*)

- Complete drawdown testing for major plant meters. Provide information to Engineering for analysis

Phase III (*December 2011 through May 2012*)

- Develop written plan for testing flow meters and performing calibrations

Phase IV (*May 2012 through July 2012*)

- Calibrate instruments using drawdown information, instrument curves, etc.

Phase V (*May 2012 through December 2012*)

- Design and install additional metering or valving if required

Annually

- Complete and report on water balance

This plan will allow for finished water metering to be used in a meaningful way by December 2012.

Responsible Party

Bernie Bullert, Director of Water Treatment and Distribution

Shahin Rezania, Public Works Engineering and Maintenance Manager for *Phase I, III, IV, V and Annually above*

Chris Catlin, Public Works Operations Manager for *Phase II, and III above*

Expected Completion Date

Completed for Raw Water Meter Calibration

December 31, 2012 for In-Plant and Finished Water Meters

**4. Un-Metered Water Usage**

PWWTD is aware of nine un-metered areas which potentially account for a portion of the 15.75% variance. These areas are: annual hydrant flushing by Water Works; main flushing during water main lining programs; flushing for sampling mains for water quality; hydrant permits; sewer flushing; street flushing; Fire Department use; Park Board use; and bridge work crew use. Monitoring all water usage will help the City in ensuring all water usage is accounted for.

**Recommendation**

IA recommends that PWWTD assess the feasibility of measuring the usage of water for the above mentioned nine un-metered areas. In addition, IA recommends PWWTD assess the possibility of charging water fees to areas using City water, as appropriate.

**Management Action Plan:**

PWWTD will assess the feasibility of the nine un-metered areas as follows:

- *Hydrant flushing, Flushing for sampling and Main flushing for lining program:*  
Most cities estimate these quantities based on flow rates and flow times by keeping a record during the year of these activities. Metering is not really feasible as this is an internal usage.
- *Hydrant permits:*  
These are now being metered.
- *Street flushing, Sewer flushing, Park Board hydrant use and Bridge flushing:*  
These uses could be metered or these uses could be estimated, based on flow rates and flow times by keeping a record during the year of these activities
- *Fire Department Usage:*

The Fire Department needs to track fire-fighting and practice fire-fighting by estimating flow time and flow rates for each time and report their usage annually to the Water Division.  
Additionally, PWWTD will assess charging water fees to appropriate areas.

Responsible Party

Marie Asgian, Senior Professional Engineer for *Hydrant flushing, Flushing for sampling, Main flushing for lining program and Hydrant permits*

Heidi Hamilton, Deputy Director of Public Works for *Street flushing, Sewer flushing, Park Board hydrant use and Bridge flushing*

Bernie Bullert, Director of Water Treatment and Distribution for *Fire Department Usage and assessing the feasibility of charging water fees to appropriate areas.*

Expected Completion Date

Completed for Hydrant permits

December 31, 2011 for assessing the feasibility of charging water fees to appropriate areas

December 31, 2012 for Hydrant flushing, Flushing for sampling, Main flushing for lining program, Street flushing, Sewer flushing, Park Board hydrant use, Bridge flushing and Fire Department Usage

## **CDM's Report on Assessment of Revenue Collection and Maintenance of Service Meters Recommendations**

The following pages contain an appendix detailing 9 of the 16 recommendations made by CDM to PWWTD in their June 1, 2011 report. IA acknowledges that all these recommendations were made by CDM. IA and PWWTD have agreed to include these recommendations along with management action plans as they are directly related to the scope and objectives of this review.

**Appendix A:**

**CDM's Revenue Collection and Maintenance of Service Meters Recommendations**  
June 1, 2011

	<b>Recommendation</b>	<b>Action Plan</b>	<b>Responsible Party</b>	<b>Expected Completion Date</b>
1	Reallocate work responsibilities of in-shop meter service staff to allow more time to conduct meter testing. Document meter testing by size and compare the rate of testing to metrics presented in consultant report.	Past experience has shown that 1½" -2" meters have a history of reliability and test within specs. PWWTD will reduce pre-testing of 1½" -2" meters and reallocate time to increased reconditioning 1½" - 2" meters for field installation. Additionally, PWWTD will continue to test all meters 3" and above in the shop and acquire a test apparatus to allow meter crews the capability to test 3" and above meters in the field. There will be ongoing testing for all meters: 1½" 8 year cycle; 2" 6 year cycle; and 3" and above 2 year cycle.	Robert Ervin, Principle Professional Engineer	12/31/2011
2	Mobilize a dedicated crew to address the back log of 200-Series and 198-Series work orders.	PWWTD has dedicated a scheduled time each week for all field crews to visit properties with open 198 and 200 series work orders. This recommendation has been started and has reduced the number of back logged 198 and 200 series work orders.	Robert Ervin, Principle Professional Engineer	6/30/2012
3	Continue the practice of installing testing ports on commercial meters and use the ports to conduct in-field meter testing.	PWWTD installed testing ports on 3" and larger meters to the extent possible based on field conditions at meter. This has been implemented. At this time, roughly 90% of our 3" and larger meters have ports installed prior to installation of the meter in a building. The remaining meters (without ports) may receive a testing port if the location within the building allows for it. This will be an ongoing process and the ports will be replaced as they are located.	Robert Ervin, Principle Professional Engineer	12/31/2011
4	Document actual labor and material costs spent on service visits. Service fees rarely cover labor and material costs; documentation of costs can support an increase in fees. <i>Note: This recommendation was developed from a study internally performed by PWWTD</i>	PWWTD verified that time and materials are properly documented on Utility Billing accounts. Meter service workers have historically documented time and materials on work orders for service calls. A system will be put in place to ensure that all work order information is documented in the account notes in the Utility Billing system. This will facilitate accurate reporting to accurately establish specific task fees. Once this analysis has been completed, new fees will be implemented January 1, 2012. Every other year the fees will be reassessed.	Bernie Bullert, Director of Water Treatment and Distribution	1/1/2012

## CDM's Revenue Collection and Maintenance of Service Meters Recommendations

June 1, 2011

	Recommendation	Action Plan	Responsible Party	Expected Completion Date
5	Improve coordination with City Plumbing Inspectors by developing a check list for new meter installations and organizing a semi-annual workshop to discuss recurring installation issues. Field crews often need to make multiple visits to turn-on service because new meters are not installed according to Code.	<p>PWWTD will conduct semi-annual meetings between meter shop and City plumbing inspections. The first meeting has already taken place and will continue on a semi-annual basis.</p> <p>Additionally, PWWTD has established a process using 311 to notify Inspections of premise plumbing issues identified by Meter staff. To date, this process appears to be working and will continue to be monitored.</p>	Marie Asgian, Senior Professional Engineer	Completed
6	Develop a quarterly, prioritized work plan listing the top 100 low-flow and zero flow accounts. The meter maintenance crews currently use monthly reports and find it difficult to investigate all accounts before another report is issued.	PWWTD hired an additional Financial Analyst and is developing tools for prioritization. This Financial Analyst will run reports and analyze data to establish a prioritized work order list for commercial properties.	Matt Brink, Public Works Financial Analyst	3/31/ 2012
7	Develop a 10-Year Meter Maintenance and Replacement Strategic Plan. Data from monthly reports (i.e., low flow meters, no flow meters) indicates Neptune-brand meters and telephone-based telemetry are problematic when transmitting accurate readings. The Strategic Plan will set a long-term vision for strategic replacement of unreliable equipment.	PWWTD will develop a 10-Year Meter Maintenance and Replacement Strategic Plan. Based on industry standards for replacement and equipment life-cycle, all City meters are scheduled for replacement in 6 years. The technology for both meters and automatic reading communication devices has advanced rapidly and will continue to improve. Included in the plan will be results of meter field testing for existing equipment to identify issues and successes. A comprehensive plan will incorporate the state of existing meter assets as well as a replacement rollout schedule.	Robert Ervin, Principle Professional Engineer	12/31/2012
8	Coordinate resource sharing with the East Yard staff to improve the efficiency of winter service turn-on / turn-off work.	PWWTD will evaluate efficiencies gained by resource sharing with the East Yard staff. The East Yard and the Meter Shop crews work closely together for certain activities and there may be an economy of scale in pooling certain tasks.	Marie Asgian, Senior Professional Engineer	5/31/2012
9	Modify user agreements to transfer the ownership and maintenance responsibilities from wholesale customers to PWWTD. It is typical within the industry for the wholesaler to own and maintain meters.	PWWTD will modify user agreements with wholesale customers to transfer the ownership and maintenance responsibilities to PWWTD. Over time, all meters tend to lose accuracy and under-read. Since water bills are generated from metered use, there is a potential for significant amount of lost revenue by providing more water than is being billed. Many of the wholesale meters are older and have not been on a regular testing program. By incorporating these meters into Minneapolis' program, the City will have greater surety that what is being billed is equal to the amount of water supplied.	Bernie Bullert, Director of Water Treatment and Distribution	12/31/2012

<b>Abbreviations Used Throughout the Report</b>	
<b>CDM</b>	The consulting firm hired by PWWTD management to address inaccurate and/or non-functioning meters and assess revenue collection
<b>GAAP</b>	Generally Acceptable Accounting Principles
<b>IA</b>	Internal Audit
<b>The City</b>	The City of Minneapolis
<b>PWWTD</b>	Public Works Division of Water Treatment and Distribution
<b>198-Series work orders</b>	198-series work orders relate to residential properties that have been flagged by the utility billing system for no-read, zero-read and other inconsistencies.
<b>200-Series work orders</b>	200-series work orders relate to commercial properties that have been flagged by the utility billing system for no-read, zero-read and other inconsistencies.