Revenue Recovery: How to Ensure You're Billing for Everything Your Customers Use

Herb Firsching

The City of Gainesville, through its utility, Gainesville Regional Utilities (GRU), owns and operates a multiservice utility that includes electric, gas, water, wastewater, reclaimed water, and telecommunications. The combined services of GRU make it the most comprehensive utility service provider in Florida, serving approximately 90,000 retail and wholesale customers in Gainesville and surrounding areas.

The water system at GRU is served by 16 groundwater wells at the Walter E. Murphree Water Treatment Plant, with a permitted capacity of 54 mil gal/day (mgd), peak day. The distribution system covers approximately 118 sq mi, with over 1,100 mi of piping and 72,000 meters. In fiscal year 2010, GRU sold 7.4 mil gal of water, with related revenue of $26 million.

The wastewater system at GRU is served by two water reclamation facilities. The Main Street Water Reclamation Facility, with a permitted capacity of 7.5 mgd, average annual daily flow (AADF), serves GRU's eastern territory, and includes reclaimed water service to two commercial customers. The Kanapaha Water Reclamation Facility, with a permitted capacity of 14.9 mgd/AADF, serves GRU's western territory, and includes reclaimed water service to approximately one thousand customers, mostly for residential irrigation. The wastewater collection service area covers approximately 115 sq mi, with over 610 mi of gravity mains, 140 mi of force mains, 167 lift stations, and 62,000 service connections. In fiscal year 2010, GRU billed for 4.7 mil gal of wastewater, with related revenue of $31 million.

In 2007, GRU initiated a massive customer information system (CIS) upgrade, which it calls SAP, requiring data cleansing that identified several billing anomalies. After implementation, the data validation activities revealed more billing anomalies due to the new CIS. Over the past five years, GRU has worked to identify, monitor, and correct these billing error events and other revenue opportunities, including:

- *Stopped meters.* Report, verify, and field-check meters reading 0 kgal for three consecutive months. Meters found to be "stopped" are repaired.
- *Estimate meters.* Report and correct incidents of three consecutive months of meter estimates. While an actual reading will eventually true-up the estimated readings for billing, events such as large leaks may create billing disputes with customers over unknown high water bills, and potential billing adjustments result.
- *Multifamily, master meter, wastewater winter maximum.* Events such as a move-in, customer change, or rate-class change result in SAP setting the winter maximum to the default 6 kgal. Most of these meters use well in excess of that amount, so GRU identifies and corrects these inaccuracies on a quarterly period.
- *Miscellaneous accounts/receivable.* These items are not in the normal course of business, such as damages, reimbursements for work performed, or payments for sales of items. They have historically been overlooked for collection of payment. The utility now monitors these monthly and performs collection activities expeditiously when needed.
- *Delayed wastewater move-in.* An established agreement between GRU and the development community deems that for new construction, billing for wastewater will not begin until either10 months from the start of the water service or three months after permanent electric service, whichever comes first. This was automated in GRU's older CIS, but is not in the new version. New water meter sets are monitored and corrected on a quarterly basis.
- *Customers within 100 ft of mains.* Staff has performed the desktop exercise of matching up customer data from SAP with system data in GIS to identify parcels that are within 100 ft of water/wastewater mains, but are not in SAP.
- *Bypass/fire lines.* Identified as potential unbilled water use, GRU is still considering an approach to addressing these holistically. There have been two specific events in which local schools tapped existing fire mains during a renovation. At one school, an illicit connection went unnoticed until the bills were reviewed, and a mil-gal drop in monthly consumption was noticed. A field investigation was conducted at the property on a Saturday to identify the connection.

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Continuing to refine the approach to revenue recovery, GRU has identified new CIS automation opportunities, responsibilities, resources (such as interns from the University of Florida), ways to prevent future billing anomalies, collections, and ways to expand the use of GIS. Third-party revenue and billing review has also been discussed.

"Revenue" and "Recovery" Defined

Revenue[i] (noun):

1. The income of a government from taxation, excise duties, customs, or other sources, appropriated to the payment of the public expenses.
2. The government department charged with the collection of such income.
3. The collective items or amounts of income of a person, a state, etc.
4. The return or yield from any kind of property, patent, service, etc.; income.
5. An amount of money regularly coming in.

Recovery[ii] (noun):

1. An act of recovering.
2. The regaining of or possibility of regaining something lost or taken away.
3. Restoration or return to health from sickness.
4. Restoration or return to any former and better state or condition.
5. Time required for recovering.

What revenue recovery means to utilities is found in a blending of these two definitions. It is the act of recovering an expected return for providing services (e.g., potable water) to customers. It is the regaining of something lost (e.g., water from meter inaccuracy), which positively impacts income. Theft of water, whether purposeful or through improper taps, can be identified and regained, thereby en-

hancing revenues. Leak detection and repair, while not revenue producing, can recover lost treated water and reduce expense, a somewhat equivalent measure to increased revenues. At its core, the normal act of everyday utility billing (providing a service and ensuring that the utility receives income from that action) is revenue recovery.

Today more than ever, revenue recovery is a critical component to the long-term financial and operational sustainability of water and wastewater utilities. Utilities must focus on providing high-quality, efficient, and competitively-priced services. In turn, customers need to pay for the services they receive. With declining water demand likely to continue beyond the most recent recession[iii] and increasing costs[iv] due to aging water system infrastructure, proper management of revenue is imperative. From the customer perspective, the utility must ensure that it is billing all its customers for what they use so that they are not carrying the burden for others.

The Genesis of Revenue Recovery

The vision for GRU water/wastewater revenue recovery was prompted by a utility-wide upgrade of the legacy CIS in 2006. In data cleansing activities, an antiquated stopped meter report was discovered. Operational staff had abandoned the report long ago, since it found many more vacant units, given the nature of Gainesville's student rental population, than stopped meters. The first run provided nearly 3,000 suspected stopped meters. A quick peruse through the meters identified several accounts, such as schools and apartment buildings, in which vacancy was a highly unlikely factor to result in zero consumption. Several field checks were made and confirmed that some meters were, in fact, stopped. A further desktop analysis, comparing the water use with other services at the property, whittled the stopped meter list to approximately 700 for actual field checks. The water and wastewater group at GRU inherited an intern from the strategic planning department to assist the water meter department with field checks. One hundred and thirty stopped meters were fixed and resulted in $120,000 in annual water/wastewater revenue recovery.

Unfortunately, the SAP implementation in April of 2007 did not encompass the necessary stopped meter reporting functionality GRU had recently reincorporated into its processes. In January 2008, internal efforts resulted in the current stopped meter report still used today, and the water and wastewater engineering group coordinated a second cleanup effort, enlisting two interns to assist. After the SAP implementation, several other billing discrepancies arose, including multifamily wastewater winter maximums and new wastewater services. It became apparent that there were items from the normal course of utility business, as well as extenuating circumstances, that could have significant impacts to operations and revenue.

It took the stopped meter revelation of the CIS implementation to identify to GRU that revenue recovery opportunities existed. Management assumptions of roles and responsibilities to identify, repair, and prevent these issues needed review and formalization. There are operational limitations, such as stopped meters, that require revenue recovery activities. Quite often, utilities create situations through designed business processes, unique rate configurations, and CIS capabilities that result in revenue recovery opportunities. Utilities may directly implement or relate to their revenue recovery activities these specific strategies that GRU uses in its approach to revenue recovery.

Strategies

Stopped Meter

A stopped meter typically occurs when the meter register no longer tracks consumption due to a physical impairment to the actual meter (e.g., debris lodged in the measuring device). Other causes of stopped meters may be the result of open bypasses or errors with electronic receiver/transmitter (ERT) meters. The customer notices no interruption of water service and usually does not report the reduction in water and related wastewater billing. The impacts to a utility from stopped meters are multifaceted:

1. *Revenue.* Customer is no longer paying for the service received.
2. *Conservation.* By virtue of not paying for the service they receive, customers are not incentivized to reduce consumption since there is no apparent price motivation.
3. *Expense.* Costs to treat and deliver the water to the customer still accrue, potentially at a faster rate based on the notion that customers use more services when they are not paying for it.
4. *Water Resources.* In an age of water rights disputes, watershed impact boundaries, and awareness that the water supply is finite, every drop of water counts.
5. *Wastewater Impact.* For utilities that bill wastewater in relation to water use, a stopped meter impacts wastewater as well, potentially with an even greater impact to revenue as wastewater rates are typically higher than those of water.

It is for all these reasons that a utility must not overlook how it identifies and repairs stopped meters.

With assistance from HCL Axon, GRU designed a custom report in SAP R/3, titled "ZDM_STOPPED_METER." This customized report is necessary for GRU to leverage being a multiservice utility. Potential stopped water meters can be cross-referenced

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with gas or electric meters, a desktop activity that can forego field investigations if another service has already confirmed vacancy at the property in question. The daily process began with interns running this report and providing the following inputs, as shown in Figure 1:

- *Meter reading unit.* Report sorts via meter read routes, which aids in routing field checks for potential stopped meters
- *Billing class.* Residential or nonresidential
- *Period.* Use most recent, full three consecutive months
- *Unit of measure.* Select service—water or reclaimed
- *Limit for stopped.* Default of 0.0

The report output, as shown in Figure 2, displays all services that meet the selected criteria and includes:

- Service address
- Customer information
- All services, meters, and related billed consumptions
- Meter readings for the specific service queried

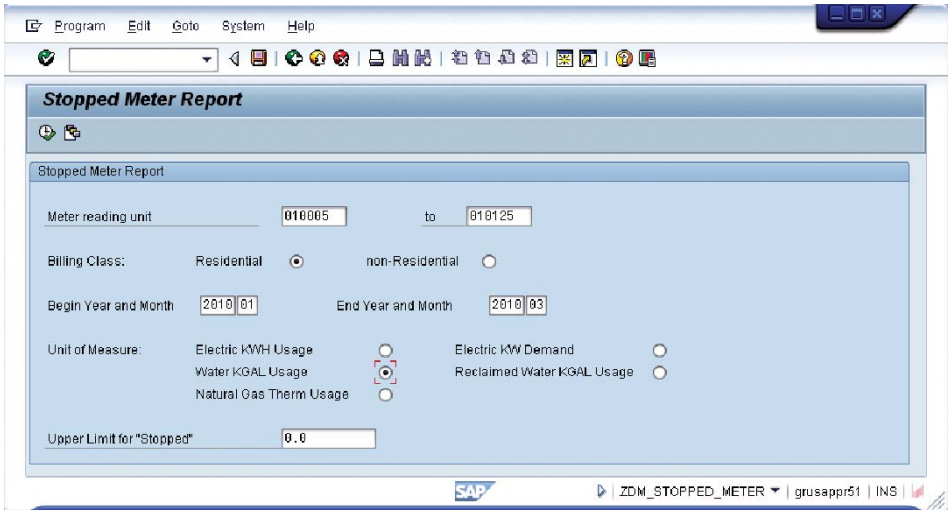

Figure 1. Selection criteria for ZDM_STOPPED_METER

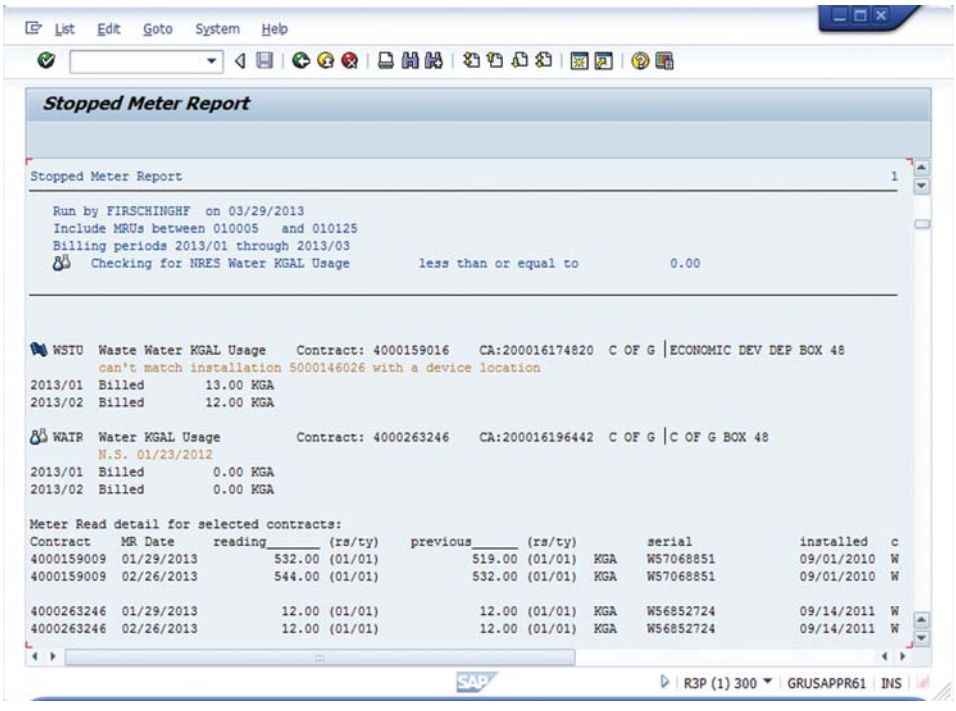

Figure 2. ZDM_STOPPED_METER Report Output

- Notations and dates of prior stopped meter checks performed

The interns review the output and identify the water meters that show three consecutive months of zero water consumption on a property that has had no other stopped meter field checks within the last two years. This subset of data is geocoded into an Esri geodatabase to spatially identify the meters and routes for performing the field checks. This information is loaded onto Panasonic Toughbooks that are brought into the field where the interns physically check the meters. They document, via redlines, using TC Technology's GO!Sync Mapbook software, the results of the stopped meter check, as well as inconsistencies they observe between what is portrayed in the GIS and what actually exists in the field. The redline information is brought back to the office, and the edits are made to the GIS.

The results of the stopped-meter check are included in SAP service orders related to the customer account associated with that meter. If the meter is found to be stopped, the SAP service order is forwarded to the water meter department. The meter is then replaced and the billing department is notified that the customer's account is in need of review for potential backbilling.

Estimate Meter

An estimate meter occurs when a physical meter reading is unobtainable, either by physical obstruction (e.g., trash, parked car, bad dog, water in meter), electronic errors with meter read uploads, ERT meter malfunctions, or the meter reader simply cannot locate the meter. An occasional estimate is normal utility practice and generally does not result in lost revenue or consumption because a true-up occurs when the next routine reading is accurate and real.

Unfortunately, if the utility does not manage estimate meters, and they occur for consecutive months to a customer, this will likely result in lost revenue through negative customer feedback; specifically, if a customer receives multiple months of estimated readings, and during that period, higher than normal usage is experienced. The next true reading incorporates that additional consumption with these resulting implications:

- *Inverted block tier rates.* Higher than normal consumption that accrued over multiple months and then is billed in one billing period will negatively impact customers and artificially charge them more because of tiered water rates.
- *Deprives customer of normal price signals.*

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Because the estimates result in typical bills, the customer has no notification of water use changes, such as a leak, and cannot respond accordingly.

Excessive estimate meter readings create an environment in which customers can dispute a bill by suggesting that it is unreasonable for the utility to hold them accountable for exorbitant use that they were not made aware of in a more timely fashion. With a focus on providing quality customer service, GRU will generally make accommodations for customers in these situations, and those adjustments impact revenue. For that purpose, GRU focuses on limiting excessive estimates, which is deemed as not to exceed three consecutive months.

Monthly, the engineering interns run the SAP R/3 ZEABL transaction that provides information on meter readings. As shown in Figure 3, the inputs include:

- Scheduled meter reading date: Select the last three-month period
- Device: Water meters
- Meter reading type: Estimate

The output is not ideal, as shown in Figure 4, and includes every single instance in which a meter was estimated during that period, whether it was once, twice, or during all three months. The data is exported to Microsoft Excel and manipulated to exclude one-month estimates. The remaining estimate meters are sorted into three-month estimates, which are to be corrected immediately, and two-month estimates that are worked if resources are available. There is an identifier, called meter reader note, on the estimate that indicates the apparent reason for it. The estimates caused by a bad dog, locked gate, unable-to-locate situation, and other nonmechanical issues are submitted to GRU's meter reading department via email for correction. The remaining estimates (e.g., broken meter or ERT errors) are submitted to the water meter department for correction and repair. The responding areas are also charged with getting a current, actual read from the meter to update the customer's account. The billing department may review these corrections for potential adjustments in regard to how the consumption was billed so that the penalties associated with inverted block tier rates are minimal to the customer.

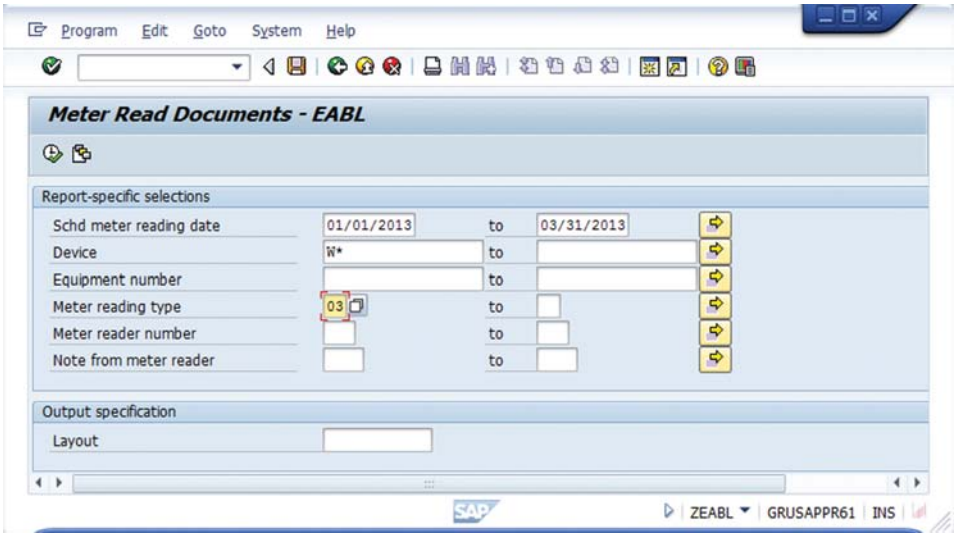

Figure 3. Selection criteria for ZEABL

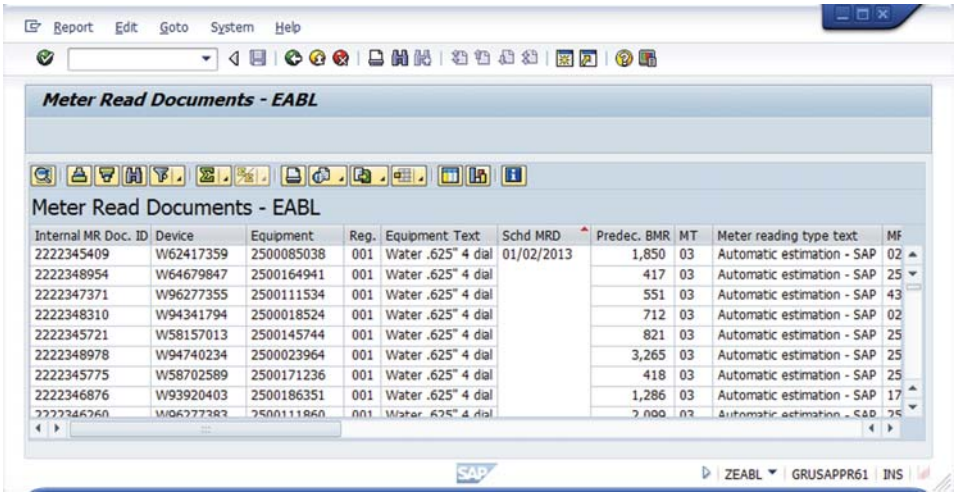

Figure 4. ZEABL Report Output

Multifamily Winter Maximum

For residential wastewater billing, GRU utilizes a winter maximum (win max) calculation, which is the maximum average daily water consumption for the immediate preceding January or February billing period, times 30.4 days, rounded to the nearest one thousand gal. For the remainder of the year, following that January and February, the customer pays wastewater charges based on the lesser of the actual water usage or the established win max. For new customers, the default win max is 6 kgal and is automatically included on the account in SAP. However, GRU's customers include several master water meters that serve multiple dwelling units. When these master meters are first entered into SAP, or change hands from one owner to the next, SAP defaults the win max to 6 kgal, obviously leading to potential enormous discrepancies in the amounts of wastewater billed.

This defect was identified a short time after SAP implementation, and GRU's customer service representatives, those in charge of creating and changing these accounts, were notified of the issue and are expected to manually adjust the win max when these scenarios occur. Unfortunately, this customer service area is responsible not only for water and wastewater, but every other service and question GRU customers pose. Couple this with the knowledge that these events, while large in potential revenue implications, do not occur regularly, and it becomes easy to understand why the adjustment to the win max default can be overlooked.

To ensure these adjustments are made, SAP R/3 transaction SE16 is used to access the specific data tables that reflect the wastewater win max data, as well as the water meter information that provides how many units the meter feeds. These raw data sets are imported into Excel, and a calculation is generated to provide the win max per unit. Any meters that result in less than 2 kgal/unit win max are evaluated to confirm that the win max is truly rep-

resentative of the type of expected wastewater use at that address. Any errors found are sent to the billing group for an adjustment to the default win max and potential backbilling. This effort is performed quarterly to ensure that backbills are not excessive to customers.

New Wastewater

For any new construction, GRU has a long-standing policy that, following agreements made with the local builders associations, wastewater will not be billed to an account of the initial customer (the builder) until after the water meter has been active for 10 months or the electric meter has been permanent for three months, whichever comes first. This was done with acknowledgement from GRU that, early in the building process, water is used in construction and landscape irrigation, and little to none is returned to the wastewater collection system. GRU's legacy CIS automated this process, but with the SAP implementation that automation was lost. Historically, this was not an issue because as builders completed their projects, the buyer would take over utility services, and wastewater would be included.

Since the housing market began to decline several years ago, there has been less new home construction and a move to construct more rental properties. Often these rental properties are builder-owned, meaning the initial customer is the indefinite customer, with no subsequent move-in to capture wastewater billing. This issue was identified a year into SAP, and immediate steps were taken to identify and correct these oversights. The process is similar to the multifamily win max, in which data is extracted through SE16, which identifies existing wastewater services that are not currently billing. Another extract identifies the related electric and water services to acquire their effective billing start dates. The extracts are compiled in Excel and sorted to identify the minimum wastewater move-in dates (lesser of electric plus 90 days, or water plus 300 days). A representative from GRU's new services department reviews the accounts to ensure there are no extenuating circumstances related to a particular address and conducts the move-in if appropriate. This effort is performed quarterly with occasional backbilling as a result.

Miscellaneous Accounts Receivable

Miscellaneous accounts receivable (misc A/R) is what GRU describes as every invoice generated that is not part of the normal course of business in providing utility service to its customers. This generally includes sales of surplus items, damages or repairs, or installation services done at a customer's request. Prior to SAP, GRU's legal department would notify an area when a misc A/R they generated had gone unpaid for a period of time. The area would then contact the customer to try to collect and refer back to the legal group if they were unable to do so. The misc A/R component, and its functionality and reporting capabilities, were not immediately critical to the success of the SAP implementation.

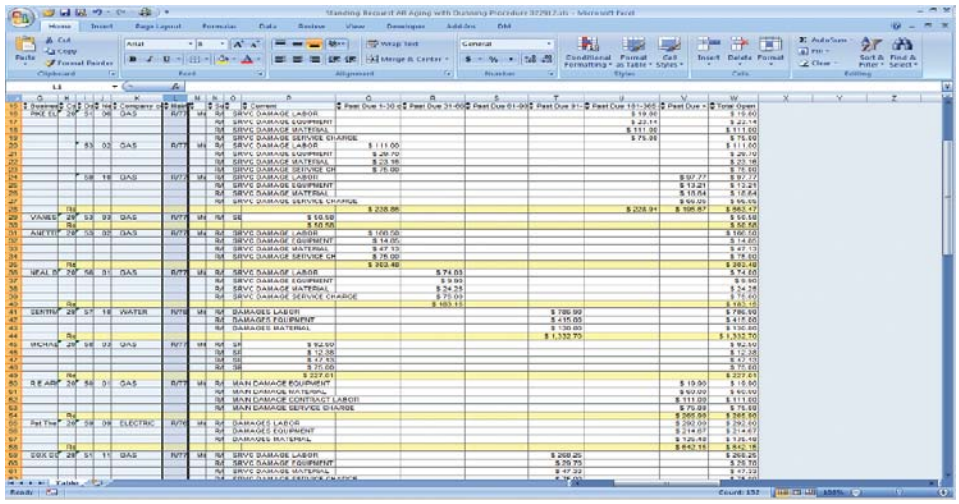

Figure 5. Misc A/R Delinquency Report

The collection of misc A/R payments needed to be self-policed since the legal department was no longer able to provide its reports. This launched a GRU corporatewide discussion about the need to address the process for misc A/R. A team was created that outlined the process, automated collections of misc A/R in SAP, and assigned roles for customer contacts and notifying the legal department when invoices became delinquent. Subsequently, a report was made available to the legal group that now is sent to applicable areas to notify it of misc A/R invoices in various stages of delinquency, as shown in Figure 5.

Meter Change Out

Operated by GRU is an 18-year meter change-out program for all water meters, except for 3 in. and larger; the large meters are tested annually. The current meter change-out program is based on an internal study from nearly two decades ago concluding that 18 years was the average meter age in which the loss on the meter would exceed the cost to replace it and recover the consumption. The current program is being updated, with these potential modifications considered:

- *A minimum usage before change-out.* Meters that do not exceed a determined minimum amount of usage per month will run to failure (stopped meter) rather than be changed out.
- *High-usage meters will be changed with a greater frequency.* High use results in greater loss as meter accuracy declines.
- *New meter technology.* Transition standard meters to those that are more accurate at wider flow rate ranges and contain no moving parts.

The initial phase will include replacing 50 to 100 meters of various ages and uses (monthly and total). Ideally, the outcome will result in a more fine-tuned approach to change-outs, resulting in operational efficiency improvements and a greater return on investment (ROI) than the current program.

Fire Lines

Recently identified by GRU are improper taps occurring on two unrelated school campuses. In the first instance, consumption at School A was observed to have decreased 1 mil gal/month, timing coincidentally with a meter relocation and on-site renovation. The apparent improper tap at School B was identified when it requested GRU to shut off the water meter while it finalized renovations, and the administration building was still served with water. Both events are currently under investigation, and the resolutions have yet to be determined. At the very least, disconnecting the improper tap and backbilling will be required.

These recent events raised awareness that improper taps to fire lines occur, and GRU has begun a comprehensive survey of peer utilities to determine an approach to the issue, including questions regarding correcting, metering, and billing for fire lines. GRU expects the approach to include three components, with increasing levels of difficulty associated with implementation:

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1. New standards for fire lines so that these events are preventable or more easily detectable.
2. Existing fire lines with accessible detector check valves will have the antiquated bypass meters replaced so the new meters can be tracked in SAP, read by meter readers, and possibly associated with billed charges.
3. The fire lines that are inaccessible will be the most difficult to address. There is some belief that leak detection technology may be applicable to identify fire lines that are active when they should not be.

Unmetered connections have obvious revenue and operational implications. Unfortunately, past water utility practices, in regard to unmetered fire lines, have made these types of improper taps more likely to occur, whether accidentally or purposefully, and more difficult for the utility to identify. The focus will be on prevention for future installations, and GRU will work on detection of improper taps for legacy systems.

Parcel Geographic Information System Analysis

A brainstorming meeting to identify other possible sources for revenue recovery concluded with the notion that it is possible there are GRU customers being served by water and/or wastewater who are not represented in SAP, although they may physically have a meter at their property. The first analysis methodology applied was to identify all GRU customer parcels that were within 100 ft of a water/wastewater main but were not reflected in SAP as receiving the service. Figure 6 shows a GIS image displaying parcels that are near water mains as blue and those near wastewater mains as green. There were 1,123 parcels for water and 127 parcels for wastewater that fit the criteria. Most of these parcels appear on the outer extent of GRU's service area, which is to be expected. About 20 parcels within city limits were checked using chlorine test strips and they identified one that was connected. That meter was added to the customer's account in SAP, and a backbill was submitted.

This type of field investigation is very time consuming, and for wastewater, requires significant coordination with customers to perform the dye test, so there has not been further advancement on this situation, as others have been more rewarding for less effort.

University Of Florida Integrated Product and Process Design

In September 2011, GRU sponsored a University of Florida (UF) Integrated Product and Process Design (IPPD) project to simplify reporting techniques currently used to identify revenue recovery opportunities. The team included a faculty member and several multidisciplinary engineering students. The team titled the project "Utilisense," which provided a web-enabled portal for data mining of GRU billing data by various user groups. Functionality includes on-screen display of information, data export for use in other tools, and various query functions. The product and source code is owned by GRU, which allows it to continue developing functionality, including automation of existing reports. This, in turn, provides analysts more time and flexibility for analysis, revenue protection, and recovery. The final product was delivered by the UF IPPD to GRU in April 2012. Two students from the team were hired by GRU to continue development of Utilisense. Additional plans for the product include combining this project with dash boarding activities currently being undertaken in GRU's rates and forecasting group.

Figure 6. Parcels Within 100 ft of Mains, but not Customers in SAP

Third-Party Revenue Enhancement

Around the inception of GRU's development of revenue recovery, a vendor approached GRU to demonstrate its service, which included similar methods that GRU was implementing, or planned to implement. The third-party vendor would locate, assess, and correct problems in the field related to water metering and wastewater collection, as well as review the utility billing database for discrepancies. The identified errors they would focus on were:

- Review water-only customers to see if they may actually be using wastewater service for which they are not paying.
- Review the billing data for rate discrepancies.
- Faulty water meters
- Bypassed meters
- Unlisted service, i.e., those customers who receive service and do not pay for it.

The program was presented as performance-fee-based, in which the third party would only receive compensation if it identified issues that resulted in additional revenues for GRU. The share of increased revenues would be over three years, and then the entire increased amount would be relinquished to GRU.

The determination was made to forego third-party assistance, while there were still several easy, yet large gains to be made by GRU internal efforts. As the fire line and parcel GIS analysis methods indicate, GRU's revenue recovery efforts are reaching the tipping point of whether the risk of the cost is worth the effort of the reward. It is now in a position to reconsider third-party revenue enhancement as a viable option to supplement internal efforts.

Conclusion

Environmental, regulatory, and economic drivers, coupled with customer expectations, continue to drive utilities to be mindful of how they utilize resources and account for revenue. Embracing an organized, practical approach to revenue recovery as a way to meet these expectations, GRU will continue to look to refine existing revenue recovery processes.

Automation within SAP is being researched to address the multifamily win max and new wastewater issues, but when automation is not feasible, the UF IPPD Utilisense will be used to create more timely reports. In addition, GRU is conducting a survey to identify best practices for fire line metering and billing, while looking into leak detection or other technologies to identify unmetered improper taps. Although GIS is being leveraged to add the spatial and property-use components to the analyses currently used, and for those being designed, a third-party revenue enhancement effort may shed further light on what remaining opportunities exist.

For utilities to take advantage of efforts similar to GRU, nothing can be taken for granted, and there needs to be an understanding of how much nonrevenue water is available to be recovered. Utility management must confirm assumptions that someone is already responsible for these revenue recovery activities and, if there is not a sole party responsible, identify a person (or people) to be the bridge for all revenue recovery activities. They may not perform every action, but they must ensure that every component of revenue recovery is being utilized.

A utility should identify those responsible for revenue recovery, so that others may refer billing anomalies or issues to them. The revenue recovery group will document any operational, billing, or process issues that impact revenue, and they will be responsible for overseeing the identification, correction, future prevention, and ongoing maintenance of these activities. The efforts must be supported by management as the need for additional resources arise, although these requests are quickly justified by the ROI. Through ROI business cases, GRU water and wastewater revenue recovery has grown from one utility analyst to an asset management group within the water and wastewater engineering department, consisting of a technical support specialist, two analysts, two Utilisense staff, and five paid engineering interns.

The revenue recovery effort, and the resources dedicated to it, will continue to grow because there is a need, as well as a justification, for the return of hundreds of thousands of dollars in annual revenue. Revenue recovery makes sense from operation, conservation, and customer service perspectives, but it also makes "cents," in that it can offset costs of the recovery activities, or even better, increase incoming revenues, as it has done for GRU.

Acknowledgement

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Footnotes

[i] "revenue." Dictionary.com Unabridged. Random House, Inc. 06 Mar. 2012. <http://dictionary.reference.com/browse/revenue>.

[ii] "recovery." *Dictionary.com Unabridged.* Random House, Inc. 06 Mar. 2012. <http://dictionary.reference.com/browse/recovery>.

[iii] Zeilig, Nancy. "Declining demand likely to continue beyond recession." *AWWA.org.* AWWA 23 Aug. 2011. <http://www.awwa.org/publications/StreamlinesArticle.cfm?itemnumber=57423>.

[iv] "Buried No Longer: Confronting America's Water Infrastructure Challenge." *AWWA.org.* AWWA 09 Mar. 2012. <http://www.awwa.org/files/GovtPublicAffairs/GADocuments/BuriedNoLongerCompleteFinal.pdf >.