Colorado Springs Utilities: Cathodic Protection Implementation Project

By **Shannon Graham, Business Systems Specialist Analyst,** Colorado Springs Utilities

Colorado Springs Utilities (CSU) is a four-service utility company that provides natural gas, electric, water and wastewater services to more than 600,000 customers. With respect to gas, CSU operates and maintains more than 2,000 miles of natural gas pipelines that service approximately 180,000 customers. CSU continually faces new challenges and is in the process of executing several large and expensive capital projects, complying with new government regulations and deciding how best to improve our aging infrastructure.

Now more than ever, controlling costs and improving business processes through technology is our key focus. Attending to the natural gas cathodic protection and leak search areas of our business have become increasingly important and by leveraging such technologies as American Innovations' (AI) Pipeline Compliance System (PCS), CSU has been able to distribute and analyze pipeline condition information in order to improve resource allocation and make accurate risk-reduction decisions.

The Corrosion Section of CSU installs, operates and maintains cathodic protection equipment and performs 10% surveys on all protected gas service risers. The Leak Search Section conducts periodic leak surveys on all gas service and main lines within the CSU gas service territory as well as performing atmospheric corrosion monitoring on all gas service risers.

These two sections are closely linked by sharing similar data requirements with regards to service line material and condition. CSU made the decision to implement PCS because we sought a comprehensive solution to the challenges facing both sections. The system is the industry standard for managing pipeline and facility data and has scalable "modules" which allowed CSU to customize the software to suit its particular business needs.

Some of the challenges facing the Corrosion and Leak Search sections prior to PCS implementation were:

— Costly close interval surveys outsourcing. Deliverables from close interval contractors mainly consisted of paper reports limiting data analysis opportunities and were costly.

— Outdated volt meter technology and data collection processes. Technicians would collect a volt reading and record it in paper log books, bring it back into the office and input into a MS Access database, possibly introducing errors during translation.

—No centralized condition data base for the gas utility. Data about the gas distribution system was spread over several systems from data bases to paper. The Leak Search and Corrosion sections took copies of a consolidated database during a re-organization and began separate maintenance functions about common data. This made it difficult to perform condition analysis to determine repair or replacement priorities.

— Data out of sync. These systems were "stand-alone" and not in sync with CSU's enterprise systems, such as the Customer Information System (CIS) and the Geographic Information Systems (GIS) For example, addresses were duplicated between systems and often not accurately matched.

— System support unavailable. Custom reports and queries for these old systems were developed by an individual who retired in 2006.

— Reams of paper. The Leak Search Section struggled with stacks of paper records and a time-intensive data recording process along with the increasing risk of hard copy records from a business continuity perspective.

— Time-consuming processes. The routing of new gas services became a timely process. All existing routes had been hand developed over time and were maintained on paper. Whenever a new subdivision came onto the gas system, the Leak Search staff had to re-route the entire existing route to allow for the additional stops manually. With the city of Colorado Springs growing 30% each year since early in the 1990s, the process was increasingly difficult to manage.

Phase I of our PCS implementation had two objectives: one, to find a better way to collect data from the field for the Corrosion Section and two, to utilize the same technology to perform close interval surveys in-house and eliminate the need to outsource. The initial focus of our PCS conversion, which we called the Cathodic Protection Implementation Project (CPIPe), was to upgrade volt meters with field data collection technology and replace paper log books.

CSU first converted 400 records of test points and rectifiers and worked directly with AI to clean and structure our existing MS Access data bases into transition files for conversion into the PCS Cathodic Protection Data Manager module (CPDM). CPDM is an integrated application for managing and analyzing maintenance, compliance and operational data for natural gas, hazardous liquids and other regulated pipeline systems. It combines the cathodic protection method of corrosion control with scalable data base management to deliver, order, and control the huge quantities of data produced in cathodic protection systems.

Because CSU did not have existing electronic data to convert for Close Interval Surveys into PCS, we first implemented the PCS Indirect Survey Manager (ISM) module in order to manage and analyze this data. CSU also purchased and deployed four Allegro Field Data Computers, ruggedized devices for capturing pipeline and facility cathodic protection data, to initiate our first in-house close interval survey in 2006.

After Phase I was completed, CSU embarked upon Phase II: the implementation of a similar process for the Leak Search Section's leak surveys and the Corrosion Section's 10% surveys. The Leak Search data had been stored for years in an MS Access database that contained a table with approximately 180,000 gas service records including address, service line location, material type, map sheet or travel path (route) and other pieces of data.

There are approximately 500 routes or travel paths maintained by hand. Several other archive tables existed that contained the approximately 800,000 surveys completed since the early '80s. The data base that had evolved through many re-organizations and data entry methodologies had inherent anomalies. CSU used the PCS Leak Survey Manager (LSM) module which provides flexible scheduling rules and classifies leak and repair data.

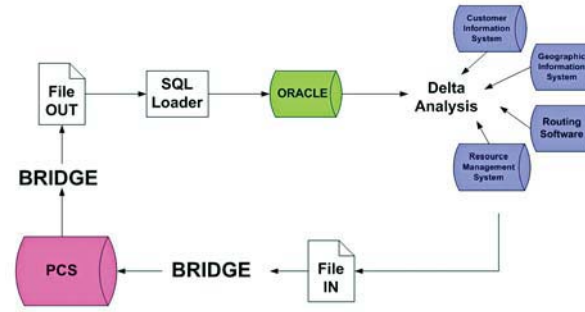

Figure 1: Process for updating information into PCS and synchronization with CSU enterprise systems.

Phase II was very data-intensive, given the number of records for Leak Search and 10% survey data. CSU linked the access data bases with the Customer Information System to resolve address discrepancies, coordinate common data sets between Leak Search and Corrosion, and identify and eliminate duplicate data to bridge into PCS.

After Phase I, CSU realized that the bandwidth and expertise existed in-house to convert this data. Due to the complexity of the data set and the knowledge transfer that needed to take place, CSU opted to do it internally.

Upon the conversion of all historical data into the PCS Modules, LSM and CPDM, CSU began to design the maintenance processes that was to keep the ever-changing data up-to-date. CSU is a distribution company and as such, we are constantly undergoing change. Our services come and go and updates happen daily. We also need to create routes based on very specific sets of conditions as well as a need to sort routes on various fields other than Milepost and Address.

Due to the amount of changes and updates, we needed to run an automated update process during the night that utilizes the PCS Bridge module to export data from PCS, perform a series of delta-analysis routines and then import those changes back to PCS.

The implementation of PCS at CSU has been invaluable in consolidating a tremendous amount of data into modules that allow for enhanced scheduling, tracking, reporting, and digital field data collection. As with every new system, we have experienced some challenges that are a result of the sheer number of services and changes that we face as a distribution company. These challenges are listed below:

- The PCS Bridge module has one time setting that can be set to start the Bridge process unattended. Because of the nature of our delta analysis, in that data leaves PCS, is possibly altered, then is returned to PCS, we are in need of two time settings for the bridge, one to export and one to import upon completion of the delta analysis. This option is available with two-way synchronization at an additional cost.
- Users are able to send routes, generated in PCS, for a particular survey to a

handheld device or hardcopy prints. PCS utilizes two fields for sorting: Address and Milepost. With the dynamic nature of our facilities, we require more sorting and filtering options. An example could be that we want to sort on a field called Route Sequence that is a user-defined field established in PCS. This assists our field technicians in the correct order for visitation based on defined efficiencies.

- We also have the need to create routes based on a certain set of criteria. An example would be to define a route of all facilities that have an indicator of CGI (Can't Get In). This route enables field technicians to revisit just these services for re-inspection.
- As mentioned before, our gas distribution data changes often and who best to record some of those changes than field technicians. The handheld technology is great for gathering inspection and survey data and downloading it into PCS. What would be very helpful for our dynamic data is the ability for field technicians to make changes to certain general information data on the handheld and have changes made to source data upon docking.

AI has been working closely with our crews and implementation staff to add functionality in their new release of PCS due out this year to address each of our challenges listed above. PCS 7.x will have improved and expanded filtering and sorting capabilities. These enhancements will dramatically increase the effectiveness of existing routing functionality.

Overall, Colorado Springs Utilities has greatly benefited from the conversion to the PCS database in a number of ways:

- We now have a consolidated condition assessment program. In the past our gas condition data was located in several disparate data bases.
- With the synchronization of enterprise data like our Customer Information System that houses violence codes, we improved our focus on safety for our field workers.
- When we have successfully integrated PCS and Route Smart, we will have an automated route-generation tool.
- Our DOT reporting is more efficient as source data is located in a single system.
- We now have a means to collect, analyze and distribute condition data about our gas infrastructure to assist the right people to make the right decisions.
- We have effectively reduced costs associated to Corrosion 10% by the elimination of data-entry personnel, vehicle and maintenance costs and overall business process improvements. ***P&GJ***

Author: Shannon Graham *has worked in the gas industry for more than 20 years in capacities such as system design, Information Technology (specifically with the implementation of Geographic Information Systems) and most recently Asset Management. The Asset Management group assists all four utilities with utilizing infrastructure data in making business decisions.*