Energy Currents

Esri • Fall 2011 GIS for Energy

Beetle Mania Hits Montana

Flathead Electric Cooperative Finds GIS Can Help

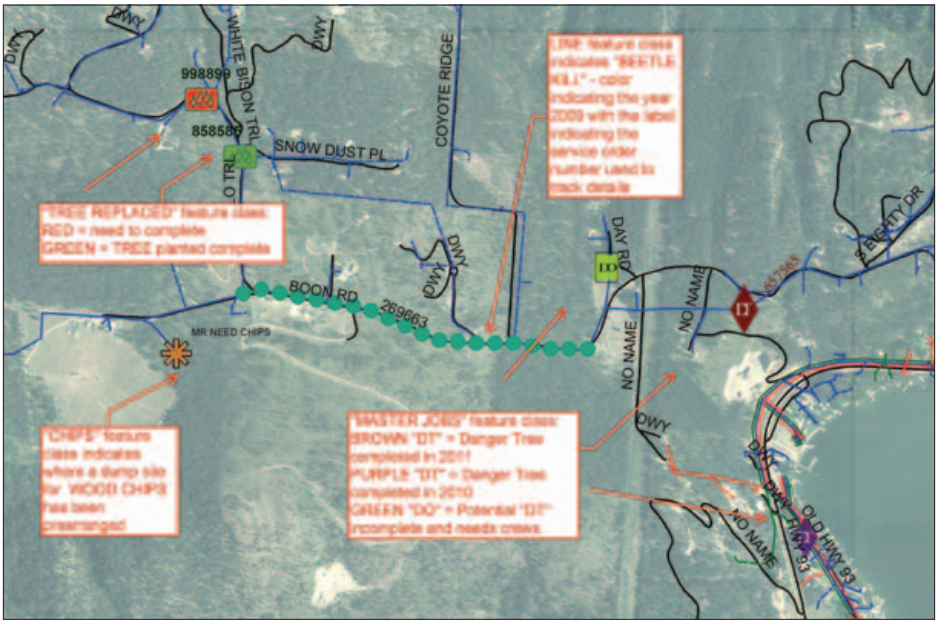
By Jessica Wyland, Esri Writer

As bark beetles silently kill hundreds of thousands of acres of towering trees in the United States and Canada, Flathead Electric Cooperative (FEC) operators are growing concerned about what this means to its members in rural Montana. Dead trees along an electric distribution line represent a distinct fire hazard and power outage threat.

In 2007, the US Forest Service blamed the beetles for killing 3.9 million acres of trees in Colorado, Montana, Wyoming, Oregon, Idaho, Utah, and Washington.

"Our aim in general is to stay ahead of problem areas by keeping track of the trees that grow near utility equipment and lines," said Steve Quigley, vegetation supervisor at FEC. "Because of the beetle infestation, stretches of the electric distribution line that were previously clear of tree interference could become a concern. Here in our service area, the 'beetle kill' has been minimal compared to some of our neighbors to the north, such as British Columbia, Canada, and in the south, such as Helena and Deer Lodge National Forests."

FEC serves more than 60,000 metered customers throughout northwest Montana, ranging from Glacier National Park just west of the Continental Divide to Libby, Montana, near the Idaho border. Since 1937, the utility has grown from a small group serving a handful of rural homes and farms to the largest co-op in Montana, with a diverse mix of rural and urban residential, commercial, and industrial members.



Beetle Kill Representaion and Other Symbology

In This Issue

Understandably, tracking tree health is a major concern for FEC. It is also a difficult endeavor. Much of FEC's 2,000 miles of overhead line runs through dense conifer forests that provide limited access to field crews.

"Our top priority is the safety of our members and employees who live and work near our facilities," Quigley said. "We are also very concerned about the reliability of our service. So, we appreciate that ArcGIS technology from Esri gives us the ability to keep track of any new developments in the study of the bark beetle infestation."

Albeit a major threat, the bark beetle problem is just one of the many issues the right-of-way management department deals with using ArcGIS.

"We rely on ArcGIS to help us spot problem areas and to be proactive rather than reactive," Quigley said. "GIS has become a primary tool in assisting us in the effort to stay ahead of potential tree problems that may be developing in certain areas and minimize the effect they can have on our power flow reliability."

Getting Better All the Time

Quigley joined FEC in 1999. Since then, he has recorded all vegetation management activities—from planning to completion—in a

continued on page 6

Esri on the Road

Electric and Gas User Conference
October 9–12
Columbia, South Carolina USA
esri.com/electric-gas

GIS for Oil & Gas Pipeline
October 24–26
Houston, Texas USA
www.gitaservices.org/websites/OG2011

Knowledge 2011 Summit
November 7–9
Amelia Island, Florida USA
www.knowledgesummits.com

Esri Online

Electric and Gas Resource Center
The Electric and Gas Resource Center is where you can find ArcGIS maps and apps that help you manage geographic information, visualize trends, and publish great web maps. To learn more, visit resources.arcgis.com and click the Electric and Gas link.

Community Speaks Up at Spatial Roundtable
Pull up a virtual chair at www.spatialroundtable.com and join the conversation of GIS thought leaders as they address topics requested by the geospatial community.

Follow the Esri Utilities Community on Twitter
Keep up with the latest GIS news, especially as it relates to the energy industry, by following Esri on Twitter:

Industry writer Jessica Wyland: @EnergyGIS
Global pipeline and gas utility industry manager Rob Brook: @robertgbrook
Director of utility solutions Bill Meehan: @bill_meehan

Webinars
Listen to a new series of monthly Electric and Gas User Group webinars with upcoming topics that include mobile GIS, DIMP, and networks. To learn more, visit esri.com/egug and click the Webinar link.

TUG ArcFM GIS Mission Critical for Smart Operations

Telvent, now part of global energy management specialist Schneider Electric, offers its ArcFM Enterprise GIS solution, deployed by more than 500 utilities worldwide. By providing a single representation of the utility grid that can be accessed across business units, ArcFM improves utility asset management, field mobility, operations and planning, and analysis efficiency. The newest developments include

- The Designer family of network design applications
- The Responder Outage Management System for gas and electric networks
- ArcFM Server for enterprise information access
- Conductor MDM for smart metering
- SaaS in the cloud solutions

Learn more at booth #107 at the Esri Electric and Gas User Conference in Columbia, South Carolina.

Decatur Utilities Gives Staff Access to Real-Time Data

Decatur Utilities in Alabama recently upgraded its IT system to provide all 165 employees with up-to-date network and customer data, a move that will reduce labor costs and improve response to outages. The comprehensive solution, based on GIS technology from Esri and Esri partner 3-GIS, allows utility staff to access, update, and share information in real time throughout the company.

"We are seeing quicker updates from the field, and that, in turn, is having a more positive impact on the daily operations," said John Kuhlman, information systems project analyst at Decatur Utilities. "The many layers of mapping available with Esri's technology allow multiple agencies within our company to access current data in ways they have not been able to do before."

Decatur Utilities, a city-owned municipal utility, provides service to more than 22,000 residential customers and 3,000 businesses. In keeping with its mission statement "to provide safe, reliable utility services at the lowest possible rate and meet the needs of customers and employees," Decatur Utilities operators see GIS as an opportunity to reduce costs and better address data management.

"We worked with Decatur Utilities to implement a comprehensive solution that could be seamlessly configured to the existing geodatabase, expanding not only the functionality but the administrative levels as well," said Tom Counts, president of 3-GIS. "The utility is now up and running with a thin-client web editing tool; a browser-based, fully functional edit application; and a mobile solution that can be deployed on a variety of devices."

Utilities Honored at 2011 Esri UC

Esri acknowledged the achievements of more than 140 domestic and international organizations with the Special Achievement in GIS (SAG) Awards ceremony at the annual Esri International User Conference (Esri UC) in San Diego, California. The SAG Awards recognize innovative and intelligent applications of geographic information system technology.

Organizations from around the world honored at the Esri UC span industries including agriculture, cartography, climate change, defense and intelligence, economic development, education, government, health and human services, telecommunications, and utilities.

"The SAG Awards highlight extraordinary achievements and efforts to improve our world," said Esri president Jack Dangermond. "Each year I look forward to being part of this ceremony. It is a tradition that means a great deal to Esri and to GIS professionals."

The SAG Awards ceremony was held at the San Diego Convention Center on July 13, 2011. Thousands of SAG Award nominations are submitted each year.

Congratulations to this year's winners of the Special Achievement in GIS Award in the electric, gas, and pipeline industries.

- Edison Mission Energy
- EQT Corporation
- SCANA
- DCP Midstream
- Better Place
- CEZ, a.s.
- COPEL
- DONG Energy
- ENERGA-OPERATOR SA
- Mazoon Electricity Company SAOC
- Swedish National Grid
- Sharjah Electricity & Water Authority (SEWA)

For more information about the 2011 Special Achievement in GIS Award winners, including project information and photos, visit esri.com/sag.

Sharjah Electricity & Water Authority (SEWA) received a SAG Award for its work to create a central GIS-based repository for utility data that includes electricity, water, gas, and fiber-optic networks. The system provides complete management of utility assets, a comprehensive utility data model, and enterprise-wide dissemination of utility geospatial technical information over the web. The system also enhanced integration with key enterprise systems and high-quality service to consumers during emergencies, new connections, outages, and daily routine service operations.

Esri and Technical Toolboxes Team Up for DIMP Solution

GIS Added to SHRIMP Integrity Management Plan

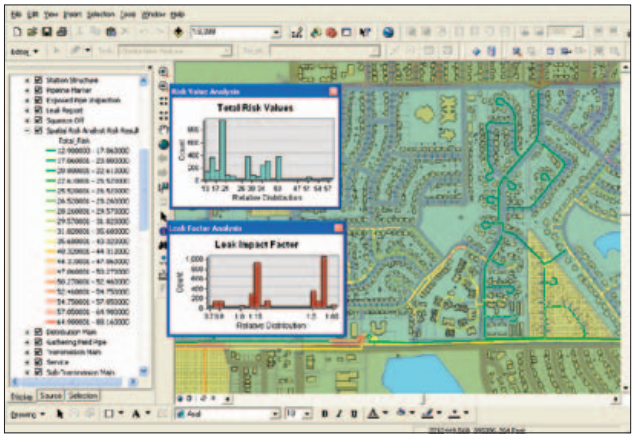
Utility experts at Esri are collaborating with Technical Toolboxes, Inc (TTI), the developers of the Simple, Handy, Risk-based Integrity Management Plan (SHRIMP), to help US gas distribution companies access GIS data for distribution integrity management plan (DIMP) submissions.

DIMP regulations, put forth by the US Department of Transportation Pipeline and Hazardous Materials Safety Administration, require each US gas utility to report on its risk-based approach to pipeline management.

"By linking SHRIMP to Esri's GIS, gas utilities can now use two industry leading solutions together," said Rob Brook, Esri gas and pipeline industry manager. "GIS technology enables gas distribution companies to connect integrity management data with geographic location in order to reduce risk, improve safety, and help satisfy DIMP requirements."

GIS will enable utilities to section a gas distribution system based on geography and other criteria defined by the operator. Additionally, GIS will provide information such as leak repair histories and equipment condition for each section, thereby reducing data input requirements.

"The SHRIMP-GIS interface will facilitate the input of data required by SHRIMP" said Vernon Mallu, the TTI SHRIMP project manager. "Operators will still be required to review and complete threat assessments. However, many of the tedious tasks—collecting and reviewing repair records and tickets, and entering this information—will be eliminated or reduced by using the data already available in the GIS."



GIS can help you meet DIMP requirements.

Discover more about how SHRIMP and GIS can help you meet DIMP requirements by watching the webinar. You can also download the free DIMP risk calculation model, and join the discussion forum to share ideas for modeling risk and consequence factors.

Visit esri.com/dimp

From the Desktop to the Enterprise—

LoGIStics Solutions that Pick-up and Deliver.

RouteSmart Technologies understands the middle name of logistics is GIS! Over the past two decades we've delivered scalable, sustainable GIS-based routing solutions that operate using the Esri® technology platform. RouteSmart software is specifically designed to meet the demanding route planning needs of the newspaper, postal, public works and utility meter reading industries.

RouteSmart TECHNOLOGIES

The world's most intelligent routing system.

To learn more call us today at 1.800.977.7284.

Powered by

esri Partner Network Gold

NAVTEQ MAPS

Esri trademarks provided under license from Esri.

www.routesmart.com

continued from cover

Beetle Mania Hits Montana

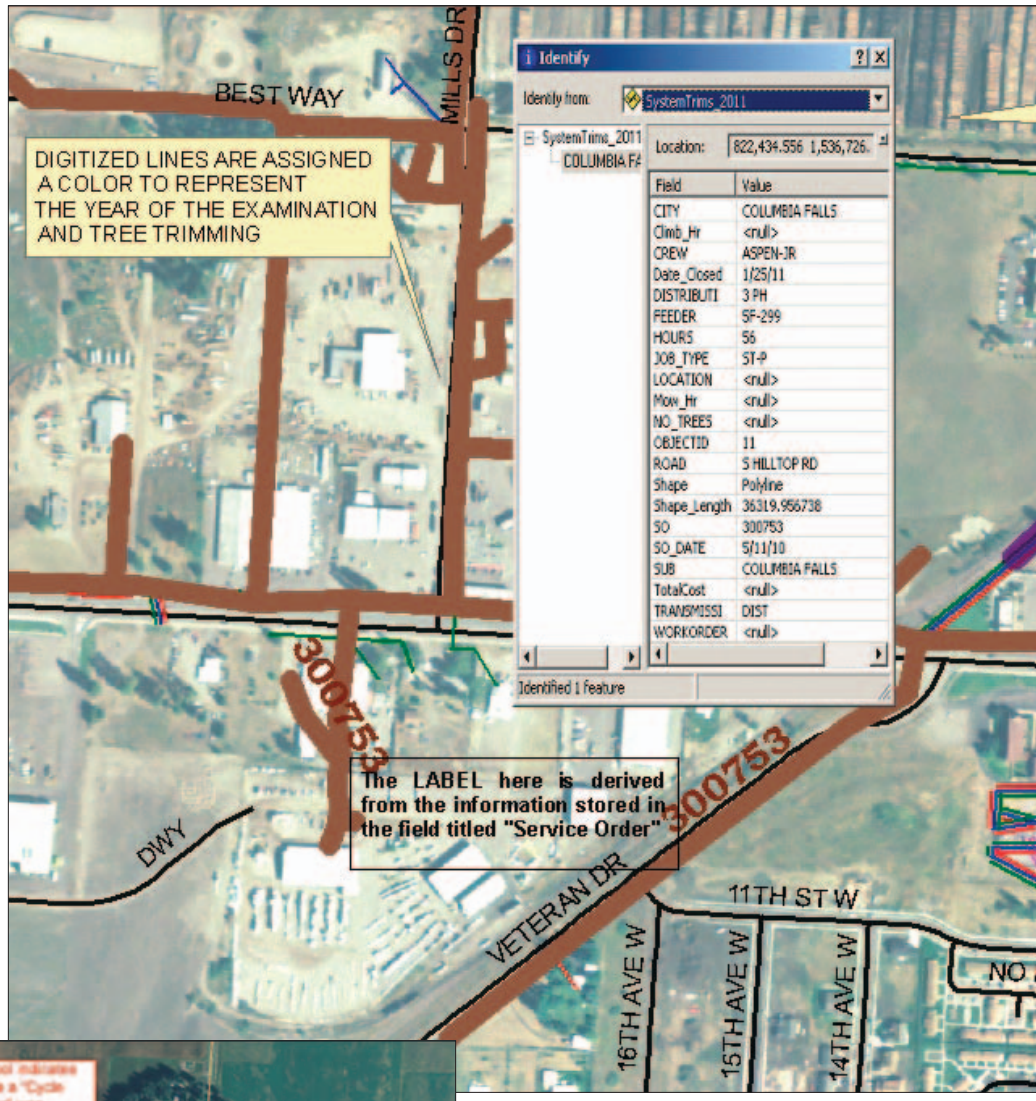
Microsoft Excel spreadsheet and on large paper maps.

"The whole process was becoming very cumbersome and inefficient," Quigley said. "The spreadsheets have been a great method for storing the data, but it became apparent to me that there were better tools available and technology had arrived that could also digitally preserve the information recorded on the paper maps."

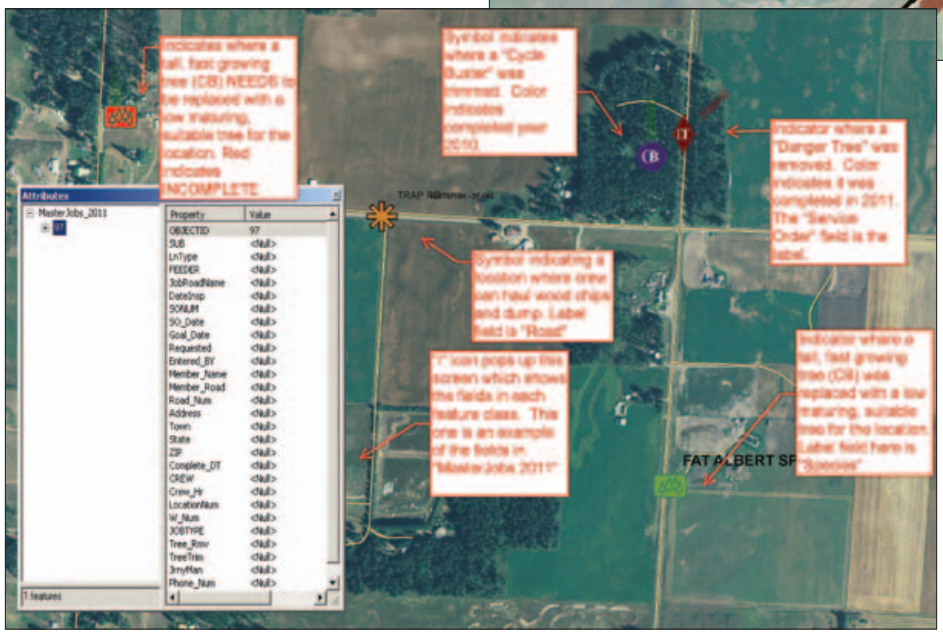
Quigley recognized the value of GIS technology and the many ways it could benefit the co-op. The opportunity to collaborate with Gayle Chvilicek, a member of the FEC GIS/Mapping Department, opened up possibilities to use the valuable information Quigley had collected.

"It was the collection of data from the previous 10 years in the spreadsheet format that set the pattern for the fields within the feature classes," Chvilicek said. "This data and the format it was in worked fantastic with the geocoding function of ArcGIS software. It enabled us to capture the history of where problem trees had been and create a foundation from which to build the new feature classes."

Chvilicek said the utility stays in "develop mode," with weekly and monthly appointments



System Trims



Feature Classes

set aside for discussion of new ideas and a review of ideas currently being tested. Staff continues looking for new ways GIS can help improve and streamline processes.

"GIS is helping us ask better questions," Quigley said. "In many cases, because of the bird's-eye view GIS gives us, it is prompting us to identify other information that can help us in the future with tasks such as establishing system trims and more accurate maintenance cycles."

Data Here, There, and Everywhere

After conducting many interviews with Quigley and using the aforementioned pattern established from spreadsheets, Chvilicek set

up the feature classes and the fields within. The symbols, with their meaning corresponding to the Job Type field, were designed, assigned, and used to track the progress of work from beginning to end. Each symbol was associated with a service order number that contained the written instructions regarding each service call.

The System Trims feature class is digitized using line segments to represent the route where large sections of overhead power line have been inspected and trimmed. The digitized lines are assigned a color to represent the year of the examination and tree trimming, with a label displaying the field with the service order number connected to it.

Another type of feature class, which digitizes with points rather than lines, was used to set up the other five feature classes. Most frequently used is the Master Jobs feature class. In this feature class, the symbols correspond to the Job Type field, indicating what kind of problem the tree created.

For instance, trees that have an immediate potential to cause harm are marked as "Danger Trees" and removed in short order. The abbreviation DT is typed into the field, which produces the visible symbol to represent Service Order Complete—Danger Tree Removed. Using the Identify icon to click the DT symbol, information is made visible in a pop-up window. This pop-up window contains data from other fields in the feature class such as Date Completed, Service Order Number, and other customer information.

A category within the Job Type field is the Cycle Buster. The abbreviation CB indicates a tree or group of trees that grows faster than other trees in the area. Landowners are generally more agreeable to the idea of removing or replacing a tree once utility staff can show how frequently the tree needs to be trimmed to keep it away from power lines and that the obvious result is increased cost.

Another of the feature classes using points is Chip Sites, which is designed to help crews find where arrangements were made in advance for wood chips to be dumped. The fields within this feature class pertain to location addresses and site details. This can lead to big savings in travel expenses when working in remote areas.

Seasonally, the utility relies on a feature class called Tree Replacements. The fields within this feature class are designed to track existing agreements to replace tall, fast-growing trees (Cycle Busters) with low, maturing, "No Trim trees." After the tree has been replaced, one of the fields can indicate that the agreement is complete, which turns the symbol from red to green. In addition, other fields in this feature class can tell what type of tree was planted and when.

Come Together with GIS

Since the company moved its vegetation management information to its GIS, there have been many benefits including more accurate information of the service area and customer data. Quigley can now access that data, along with other useful tools, on a laptop. This saves time and travel, especially when work takes him to more remote areas for investigations and inspections. Published maps with selected feature classes are included and updated weekly.

In the office, Quigley is able to create paper maps for tree crews with notes and comments to assist them. The Master Jobs feature class shows data for previous years and allows the utility to see what needs to be done as well as what types of problem trees is in a particular area. The Outages feature class tracks outages caused by trees. An unusual number of outages in an area would serve as a flag to warrant further investigation.

"These outages could be the result of many trees that have died and are beginning to topple into the line as a result of beetle infestation," Quigley said. "Many outages in an area caused by trees could also indicate that it is time to set up a system trim, possibly sooner than it was scheduled."

GIS allows the utility to identify patterns and detect problems areas. This helps direct tree crews to the most important needs first and, in many cases, take care of the situation before it becomes a costly problem.

"GIS technology is an important factor in improving our ability to be proactive in our efforts to be aware of areas where trees have the greatest potential to damage equipment or disrupt service," Chvilicek said. "With GIS, we are better equipped to make the best-informed decisions and formulate the best strategies to keep our crews focused and working safely and efficiently while maintaining reliability of service."

For more information, contact G.Chvilicek@flathead.coop. Visit esri.com/electric.

SEMCO Wins New Customers with GIS for Marketing

By Jessica Wyland, Esri Writer

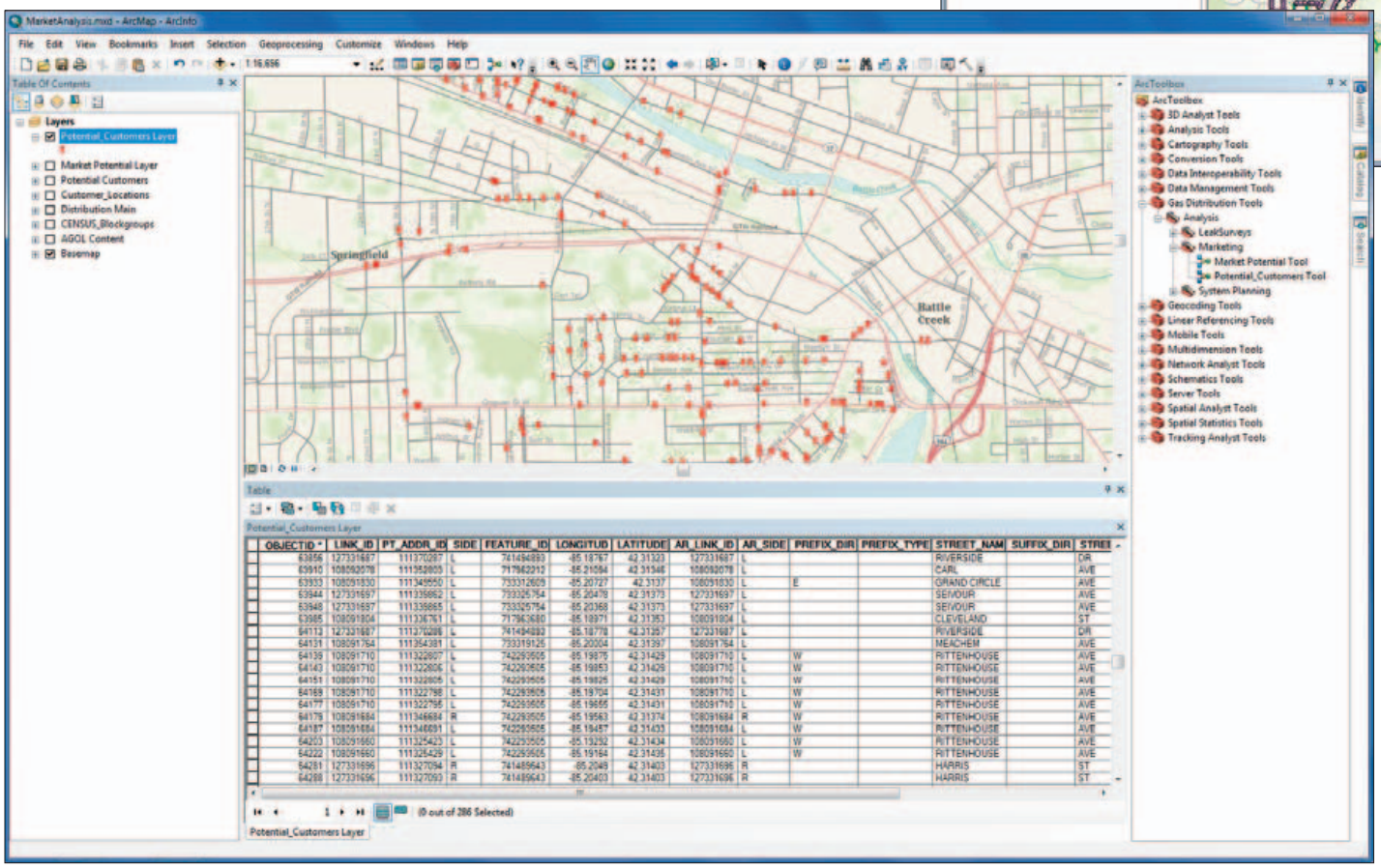
SEMCO Energy Gas Company supplies natural gas to more than 280,000 customers in Michigan. When the state's economy was hit by troubled times, SEMCO's annual customer growth halted, and in some cases, the company even lost customers. Building and development stopped. Customers were moving, losing jobs, or foregoing expenses. SEMCO's marketing director asked what GIS could do to help grow the utility customer base despite the lack of new construction.

SEMCO employed GIS technology to identify people who lived near a utility gas line but were not already customers. The utility purchased commercial street data from NAVTEQ and Tele Atlas. With this information, SEMCO geocoded new address data and existing customer information, performed field verification, and determined potential customers.

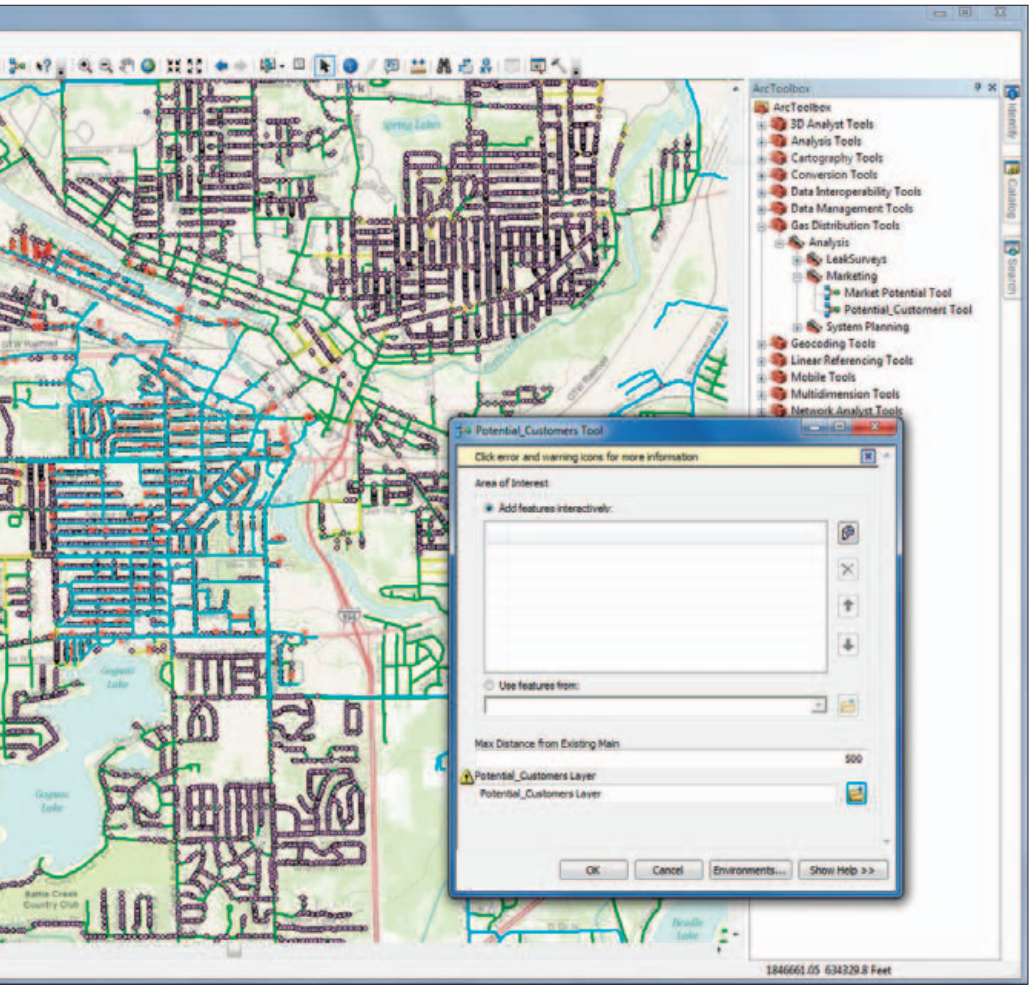
The marketing staff then contacted these potential customers through a direct mail campaign. When potential customers called in response to the mailer, the utility was ready. Staff had access to a GIS-based website loaded with unique customer codes, geographic data, aerial photographs, and a measuring tool for over-the-phone service connection estimates.

From the initial geocoding sweep, SEMCO identified 10,000 potential customers. The company then contacted these potential customers in phases by mail. SEMCO established codes for each potential customer to identify customer location. The first phase of mailing prompted 600 calls and resulted in more than 150 new customers.

Using ArcGIS technology, SEMCO staff created a web application for storing and accessing data such as customer codes, aerial photographs, and geographic locations. When a potential customer called with a customer code, SEMCO staff could find and flag the customer on the map. The web application



Results of Potential Customers Geoprocessing Tool Showing the Locations Where Potential Customers Are Located



Results of Potential Customers Geoprocessing Tool Showing the Highlighted Distribution Mains and Locations of Potential Customers

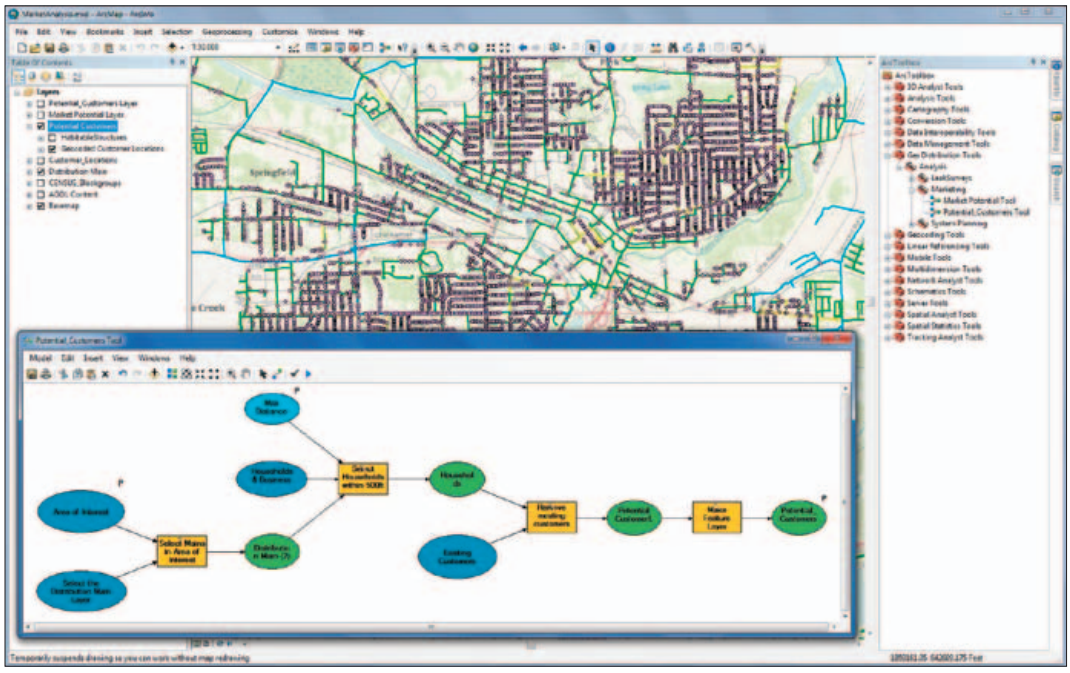
also has an address locater so callers could be identified through an address search.

Through the GIS-based application, SEMCO staff can select the point on the map and add info about the customer including telephone number and current energy source such as electric, wood, or propane.

The application also provided SEMCO staff with access to aerial photos and a measuring tool. While on the phone, callers could receive a ballpark price quote for service connection based on the distance between the customer's home and the natural gas facilities. This feature saved the utility the time and expense of sending a technician to each home to create a service connection quote.

"With ArcGIS, we were able to create this web application and then allow multiple people to access the system at the same time," said John Cutcher, GIS specialist for SEMCO. "With this new use for GIS technology, SEMCO was also able to create another marketing tool, enabling the company to better target potential customers. It's been a very successful project—taking GIS beyond a mapping and information system."

Visit esri.com/gas.



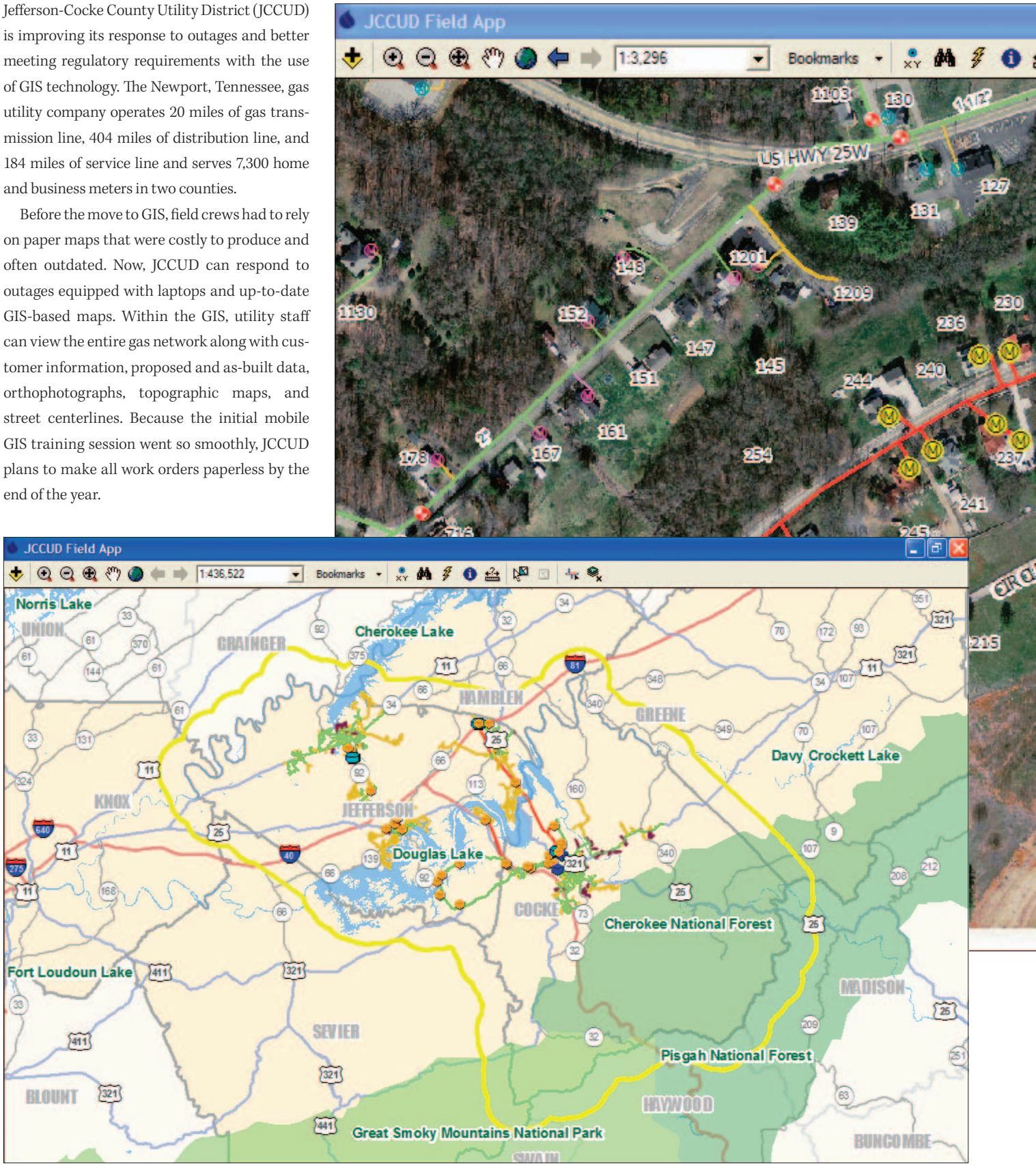
Geoprocessing Tool That Displays the Locations of Potential Customers within a Specific Distance Surrounding the Distribution Mains

Gas Utility Upgrades to Manage Outages, DIMP

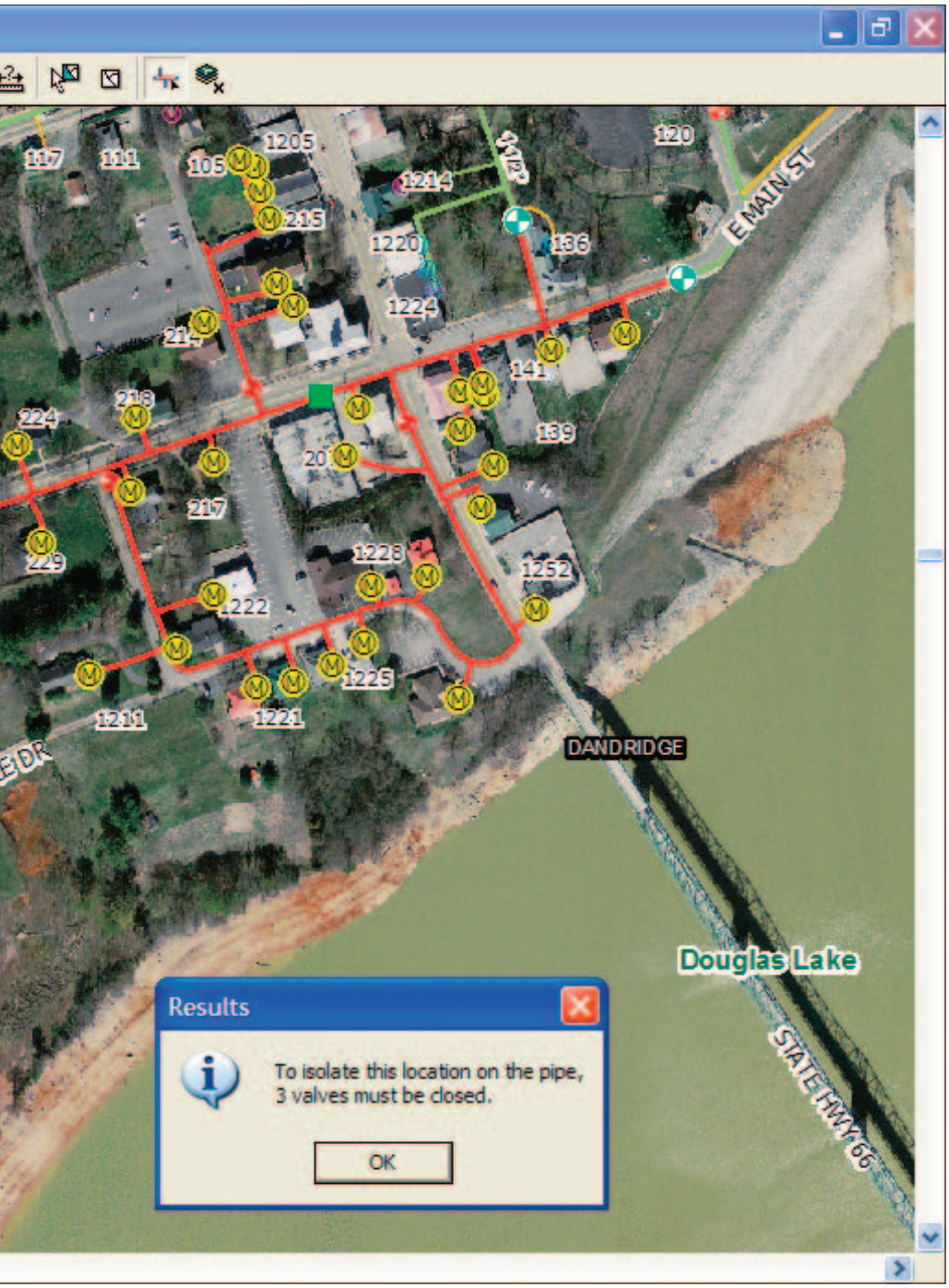
By Jessica Wyland, Esri Writer

Jefferson-Cocke County Utility District (JCCUD) is improving its response to outages and better meeting regulatory requirements with the use of GIS technology. The Newport, Tennessee, gas utility company operates 20 miles of gas transmission line, 404 miles of distribution line, and 184 miles of service line and serves 7,300 home and business meters in two counties.

Before the move to GIS, field crews had to rely on paper maps that were costly to produce and often outdated. Now, JCCUD can respond to outages equipped with laptops and up-to-date GIS-based maps. Within the GIS, utility staff can view the entire gas network along with customer information, proposed and as-built data, orthophotographs, topographic maps, and street centerlines. Because the initial mobile GIS training session went so smoothly, JCCUD plans to make all work orders paperless by the end of the year.



An overview of the JCCUD system shows the two counties served by the utility and a two-mile buffer within adjacent counties.



JCCUD operators simulate a main line leak using a mobile application to identify the parts of the system that would be affected.

"We cut $1,200 this year in the cost of printing map books, not to mention the hours saved working on the map books and returning to the office for sketches," said Larry Masters, engineering/GIS coordinator for JCCUD.

Access to mobile GIS technology will also help the gas utility with reporting for regulatory compliance. JCCUD crews will have the ability to input data from the field and synchronize with the home database to ensure the accuracy of valve and regulatory station maintenance, as well as odorization and cathodic protection reports.

"We rely on Esri technology and software greatly in our DIMP [Distribution Integrity Management Program]," said JCCUD operations manager Danny Barding. "GIS allows us to identify problems and see them in a spatial environment rather than a report or a file somewhere. It makes it easier to correct those issues during routine maintenance."

Barding said the utility is working with Esri technology to build an internal DIMP web page that holds its Simple, Handy, Risk-Based Integrity Management Plan (SHRIMP), based on a model developed by Technical Toolboxes, Inc. (TTI).

"We want total transparency and will use the web page to walk the regulators through our report," Barding said. "We were able to accomplish our goals using the risk calculation model from Esri. I couldn't have done it by myself. The model is a free solution. All I have to do is point it to my data. It has helped me clean up the database and make it more efficient by combining feature classes and dropping unnecessary attribute fields."

According to Barding, the use of GIS, along with SHRIMP, has led to increased efficiency, an ability to pinpoint problem areas, and better data management. The utility anticipates saving money because staff will not have to track down records to look at problem areas.

"Larry Masters, along with David Speight with True North Geographic Technologies, did an outstanding job in developing this system for our utility," Barding said.

True North Geographic Technologies is focused on creating solutions that help small- and medium-sized organizations make the transition from desktop GIS to enterprise solutions connected to key business systems. True North's staff is experienced with multiple web development technologies and can offer strategies for quickly incorporating data from existing line-of-business applications to create custom applications, such as operations management portals and business performance dashboards, using the .NET, Flex, and JavaScript tools for ArcGIS for Server. Visit esri.com/dimp.

Energy Currents is a publication of
the Electric and Gas Solutions Group of Esri.

To contact the Esri Desktop Order Center,
call
1-800-447-9778
within the United States
or
909-793-2853, ext. 1-1235,
outside the United States.

Visit the Esri website at **esri.com**.

View *Energy Currents* online at **esri.com/energycurrents**
or scan the code below with your smartphone.

127299
DUAL31.1M10/11sp

Advertise with Us
E-mail ads@esri.com.

Submit Content
To submit articles for publication in *Energy Currents*, contact Jessica Wyland at jwyland@esri.com.

Manage Your Subscription
To update your mailing address or subscribe to or unsubscribe from Esri publications,
visit esri.com/manageyoursubscription.

International customers should contact an Esri distributor to manage their subscriptions.
For a directory of distributors, visit esri.com/distributors.

Circulation Services
For back issues, missed issues, and other circulation services, e-mail requests@esri.com;
call 909-793-2853, extension 2778; or fax 909-798-0560.

Electric and Gas Solutions Group

Bill Meehan, Director
E-mail: bmeehan@esri.com
Tel.: 909-793-2853, ext. 1-2135

Laurence Litrico, Coordinator
E-mail: llitrico@esri.com
Tel.: 909-793-2853, ext. 1-2904

Robert Brook, Global Pipeline and Gas Utility Industry Manager
E-mail: rbrook@esri.com
Tel.: 909-793-2853, ext. 1-3536

380 New York Street
Redlands, CA 92373-8100