Streamlining Gas Transmission Management
At Public Service Company of New Mexico

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Abstract

New Mexico’s largest supplier of Natural Gas Services was faced with the need to centralize, streamline and increase the efficiency in the management of its Gas Transmission assets in order to meet the ever-changing demands of the utility industry and regulatory arena. Utilizing the functionality of an existing Electric Transmission System GIS application (eTAMIS) as a foundation, PNM has built an ArcGIS Gas Transmission application (gTAMIS) that includes a simple field-editing module based on ArcPad to aid in incorporating data changes. This application continues to increase corporate wide efficiency by being the geographic anchor for a comprehensive Federal and State Regulatory Compliance program.

The Company

Public Service Company of New Mexico is the largest provider of electricity and gas in the state of New Mexico. The Gas Business provides service to 442,455 total gas customers throughout the state in 73 incorporated towns and many other rural areas. Its transmission system consists of approximately 1,700 miles of transmission pipeline. The utility is regulated by the Pipeline Safety Bureau of the New Mexico Public Regulatory Commission and is subject to both state and federal regulations.

The Old Way

Prior to gTAMIS the Gas Transmission management system at Public Service Company of New Mexico (PNM) was fairly typical of the industry. Decentralized system records and diverse sources of data required extensive time and resources to locate when needed.
Various old maps of facility locations and construction drawings still remained on linen (these drawings are in fragile condition and are difficult to access) or in various electronic formats; records containing facilities data necessary for planning, operation, and regulatory reporting - such as class location, MAOP, and construction as-builts - were in paper files (making access to current data extremely time consuming); most of the records for the maintenance and inspection of gas transmission facilities were still paper-based (making access to and analysis of the historical information, scheduling, and resource optimization difficult); and GIS data was scattered and in various systems and projections, which made it difficult and time consuming to combine data for system-wide analysis and querying.

The New Way

The gTAMIS application is designed as a tool to meet identified and desired business goals. These goals include maximized access to information, improved productivity, provision for current and accurate information, and limited redundancy within the utility's internal processes through the centralization of data sources that are accessible online. Furthermore, it provides planning and analytical capability through visual mapping of gas transmission system facilities, their selected attributes, and their operating limits. It assists in planning, scheduling, and verifying regular maintenance and inspection on gas transmission facilities. In addition, gTAMIS provides access, routing, right-of-way (ROW), and map data to assist field crews in locating and accessing facilities. It also automates new inspection and maintenance records that are required by regulatory agencies and provides historical access to those system records from component queries. It provides for consolidation of applications to a standard platform/tool and integrates GIS capabilities with other systems. Finally, the application was developed around the theory of utilizing common base data for systems – for example using geographic base data from the TAMIS system as the base data for the Gas Application.

Figure 1 illustrates the old way and the new way with the Gas Application. Previously for a user to access gas transmission information, they had to look in multiple databases and paper files, as well as search for sources of data from additional users. This was extremely time consuming. Now the application has one centralized repository for data that allows multi-user access.

Figure 1: Old Way vs. New Way

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<th>The New Way</th>
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The Gas Application utilizes a multi-user geodatabase and application that allows for the query, viewing, modification, and addition of data associated with the gas transmission system. The Gas Application is based on the ArcGIS platform to enable spatial relationships and feature attributes to be queried and displayed for analysis. Users can select specific facilities or data objects to view associated data by querying attributes and historic inspection and maintenance data. The Gas Application interfaces with at least four PNM systems and various other digital documents:

The Gas Application enhances PNM operations by providing maximum productivity for gas transmission asset information through: consolidation of data into one centralized repository; consistency of data formats; continuous maintenance for up-to-date data; and uninterrupted functionality of the current systems.

The figure below shows that the Gas Application is the interface for use of existing maps, databases, existing applications, images, CAD drawings, and multimedia files to display and analyze gas transmission data. It also illustrates how the Gas Application is situated in the ArcGIS family and shows how it can be leveraged by other GIS software applications.
The Gas Application Provides The Interface With Other PNM Systems

Network Accessibility

The gTAMIS Gas Application has been developed to utilize the Citrix terminal technology to meet the remote field offices requirement that an application response time be reasonable as well as enhancing the performance of their job functions.

Through Citrix, these offices have quick access to the Gas Application and its data, even if utilizing a dial up modem.

The Application

The Gas Application allows the user to view various spatial data layers individually or in combination with other data layers to identify spatial relationships. The user can query the attributes of data objects. Special forms provided allow for the querying of additional data such as schematics, photos, and historic information integrated from existing inspection and
As an example, the user opens The Gas Application...

And zooms into a selected area that he/she wishes to view with greater detail. The user could also book mark this particular area for quicker access to this data on return visits.

As they zoom in, they start seeing spatial relationships and overlays.
By selecting a feature with the identity key a table of attributes appears on screen.
Using a custom user interface, specific tools and key major gas system components are listed in a window on the screen, like in the example below.

![Station Detail](image)

Clicking on the location of interest (for example, Photograph), the available information appears in the form of a digitized photo.
Query and Inspection Engine

One functionality provided by gTAMIS is a query and inspection engine. The user can select the Mainline, Station and feature within the station to obtain information on the feature as well as conduct an inspection. Information includes CAD drawings, any documentation and images of the station and feature.
Additional Functionality

The application provides the user additional functionality such as:

- **Isolation** - if a section of the pipeline in the system needs to be isolated that application will indicate the closest valve locations to be operated to allow for isolation. It will also indicate the new route.
- **MAOP** – the application allows the user to query sections of pipeline to see the MAOP rating as well as view the MAOP records.
- **System Certification** – the application has the functionality built in to electronically assist in the establishment of System Certification requirements.
- **Routing** – the application provides a directional routing solution for the user taking into consideration environmental and right of way constraints.
• Right of Way and Environmental information – the user can select a portion of the pipeline and view any right of way documents or environmental concerns for that section.
• Moving Mile Analysis – this functionality allows the user to select the section of pipeline for class location purposes, choose the buffer width and distance increment for analysis and the application returns a visual analysis for class location.

Field Operations

The gTAMIS application provides unique functionality for the field crews to provide field edits. Files are transferred from the ArcGIS application to an ArcPad application that allows both geodatabase and attribute changes to be indicated. As the field user connects to the network and launches gTAMIS a seamless application runs checking for Any changes made in the field. If there are changes, the gMOD application processes them and notifies the GIS department that changes need to be made. The field user is also notified, through email, that the changes have been logged and will also be notified as soon as the changes are incorporated.

Summary

The Gas Transmission application, gTAMIS, has provided a used and useful tool. Field Crews are viewing the same information and screens that the in-house workers see. Through the function of field editing changes and discrepancies found in the field are automatically sent back to be incorporated into the geodatabase while historical data is maintained. The application has allowed for standardization of practices that were once disparate and disconnected. Reporting functionality allows for tabular reports to be generated for a myriad of purposes – system analysis, regulatory compliance, maintenance activities, etc. Up-to-date electronic data is immediately accessible reducing the need to dig through paper records to find information, many times outdated.

Where Do We Go from Here

The gTAMIS application has been designed to enhance gas transmission operations. Much of the functionality applies to PNM gas distribution also. As a result, PNM has begun development of AMIGO (Automated Mapping and Integrated Gas Operations). This application, originally intended to primarily exceed regulatory reporting and compliance requirements, will include centralization, enhancements and improvements to streamline overall Gas Operations.
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