

Integrating New GIS Technologies

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Chesapeake Energy deploys mobile mapping device to incorporate asset records in the wake of acquisition.

When Chesapeake Energy acquired the assets of century-old Columbia Natural Resources (CNR) in late 2005, it found that CNR's pipeline mapping system had not been integrated into its own application systems and databases. Developing a geographic information system (GIS) that integrated these elements became a top priority and a major challenge.

Columbia Natural Resources, since renamed Chesapeake Energy Eastern Division, owns more than 8,500 producing wells; a lease hold of approximately four million acres; and 7,500 mi of pipelines and associated facilities, including measurement stations, valve settings, fluid extraction devices and tanks.

In an attempt to help manage these assets, CNR had launched a mapping conversion project years ago to integrate all its paper maps into one central CADD system. Since the company's assets included several predecessor companies that had been acquired over time, the maps and data from each of these companies varied in virtually every respect, including accuracy, different mapping datums and symbology standards. The project was completed in 1993, and maintained thereafter, accommodating both internal growth and growth through various acquisitions, to reflect the company's current assets.

The complete CADD mapping system enabled the company to maintain and publish maps much more efficiently. By progressing from paper to digital maps, each map feature and asset type could be maintained within unique CADD layers, which allowed for custom map



The Magellan MobileMapper CE has enabled Chesapeake Energy integrate the pipeline assets of Columbia Natural Resources into its own GIS capabilities.

publication by selecting multiple layers of data based on users' needs.

But as progressive as the new system was, its limitations became apparent over time. Most notable were compatibility issues with the graphic CADD data and existing databases of related features. For example, the mapping system included a layer of the company's well locations, but users could not access it together with the valuable well data that was available in the well database system. Overall, the CADD system was not integrated with the available database resources to make an efficient GIS. There was a huge disconnect.

The GIS solution

A few years ago, CNR explored the possibilities of using this valuable CADD data to develop a GIS, and although everyone involved recognized the value of such a system, the timing was not right because of budget constraints and an impending change of company ownership.

With the acquisition by Chesapeake Energy, the time to convert to GIS had come. Creating a complete and accurate GIS resource for the combined divisions was essential. Luckily for the new Eastern Division, the parent Chesapeake Energy had already implemented GIS on the ESRI ArcGIS platform. With the guid-

ance of an ESRI consulting team and the GIS staff in Chesapeake Energy's headquarters office in Oklahoma, the company is now at the threshold of implementing an integrated GIS after beginning the conversion of CADD data some eight months ago. But it hasn't been without several challenges along the way.

Challenges to overcome

The greatest challenge for the integration was the sheer volume of CADD data that first had to be converted to the ESRI platform. The GIS team included representatives from the various departments it serves, including geology, land, and pipeline facilities. The team's first challenge was to assess which types of graphic data could be linked to existing company databases. The problem was that all of the data to build the GIS foundation came solely from a graphic system that contained no attribute data. By grouping the data into three major categories – lease parcels, wells and pipelines – it was obvious that implementing GIS would yield immediate benefits for the lease and well categories because of the available databases that could be used with them.

However, the pipeline category and associated field facilities presented a major challenge to the team. The only available source of pipeline data to create a complete and accurate GIS was a graphic representation of a 7,500-mi pipeline system. What did not exist was the critical component of a system database to correlate with the graphic data. Furthermore, the current and new aggressive expansion and acquisition of properties, wells and associated pipeline construction added a tremendous new burden to the task.

The dilemma was this: how to efficiently collect accurate pipeline data while simultaneously capturing all related attribute data to build an intelligent model of the pipeline system. Chesapeake needed a solution that would handle not only very substantial new pipeline construction, but would

also populate the system with all existing facilities over time.

The Magellan MobileMapper

Chesapeake needed to update and identify the locations of existing field assets and capture new ones so that the new GIS could be implemented.

Furthermore, once the GIS was created, the company needed to disseminate the information for use in the field. They knew that the collection and use of the field data would be undertaken by dozens of personnel from different specialties. It was important that the GPS field data collectors would be low-cost and easy to use.

Additionally, the receivers needed to be sub-meter accurate, provide measurements in real time, and be able to upload and download standard and proprietary road and topographical maps, proprietary shape files of property lines, and previously recorded facility locations and attributes for access and use by field personnel. After evaluating the products on the market and with the aid of Charleston Blueprint (a Charleston, West Virginia-based company), Chesapeake chose the Magellan MobileMapper CE, GPS field receiver and data collector.

The MobileMapper CE offers an open platform on which any number of onboard software programs can be used. Chesapeake elected to load SoloField software for its ease of use.

It was decided that at least 100 MobileMapper CE units were required because of the volume of data that needed to be captured, and because of the broad and growing operating territory. To date, more than 50 units have been deployed with various Chesapeake field personnel. The sheer number of units also meant that the relatively small GIS staff would be inundated with enormous amounts of data coming in from the field. The staff was concerned with how they would cope with data management and maintaining data integrity as it organized, validated and assembled the central GIS repository

The problem that wasn't

The GIS team first had to visualize what the final product should be, and then create a GIS geo-database to capture all the required pipeline attributes. In essence, the team had to create an empty database and work backward to populate it. This process required the involvement of several of the company's business units, including field operations, pipeline/production engineering, and regulatory compliance to ensure that all required data would be captured.

Once that was done, an onboard feature table was created for the MobileMapper CE that allows the user to easily record all necessary pipeline and facility data along with the attribute data that is required to populate the geo-database. If all of the MobileMapper units are using the correct feature table, the data management and data integrity issues can be easily controlled. In fact, large volumes of field data can be validated and published to the system so efficiently at the office level that it does not appear to matter if data is received from 50 units or 500 units.

Another source of early concern was how quickly field observers could learn to use the units effectively. The user-friendliness of the MobileMapper CE along with the excitement and willingness of field personnel to work with the new technology has been a big help in this area. At first glance, using the MobileMapper CE might appear daunting. That fear was quickly overcome once the field technicians, trained with the help of the vendor Charleston Blueprint, realized that the MobileMapper CE and the menu-driven SoloField software and feature table is easy to use, and helps keep errors at a minimum.

Already, GIS data is flowing back into the field. Mapping data based on the GIS is being deployed back into the field for use on field PCs and the MobileMapper CEs. The information that is fed back is provided as a Shape file that enables field groups to place and manage the data into their own project applications as they wish. ■