# Accurate Pipeline Maps
## Essential for Good Planning or a Threat to Pipeline Safety

by Lee Hartsfield, GISP

Maps are a basic output of any geographic information system, GIS. Today, a GIS is a unique system designed to input, store, retrieve, manipulate, and analyze layers of geographic data to produce interpretable information. The quality of the interpretable information provided by a GIS is based on the accuracy, timeliness and completeness of the geographic data that is supported and provided to its users. In visualizing and communicating geographic information, a user must consider several implications about the nature of geography;

> "An immense range of detail and complexity characterizes our surroundings. Environmental forms and processes are linked and intertwined into a diversity of scale-dependent feedback loops. Thus, a change in one thing is likely to have repercussions throughout the environmental system. *Nothing in our surroundings can be viewed in isolation without risk of misunderstanding.* Yet, despite such problems, it is desirable that environmental understanding precede planning, policy making, and action. It is to this end that we enlist the standard vehicles of thought and communication: natural languages, numbers and graphics. Of these indirect non-sensory means of dealing with our surroundings, maps alone are explicitly designed to capture or preserve the geographical (spatial) dimensions of environmental features in concrete form."
>
> *Muehrcke, Philip C., Map Use - Reading, Analysis and Interpretation, 2nd Edition, JP Publications, Madison WS*

As is stated by Muehrcke in the above statement, environmental understanding should precede planning, policy making and action. Environmental impacts consist of both natural features and man-made features. As local governments attempt to mediate development activities within a community, GIS has become a planning tool which provides the capabilities of visualizing the complex environmental characteristics and impacts of location.

In acquiring, visualizing and analyzing geographic data, GIS has leveraged our systematic information-gathering procedures of ground survey, census and remote sensing. Technology improvements in these areas have improved the relative accuracy of these procedures. In turn, the improved relative accuracy has enhanced the value of GIS and maps for analyzing environmental impacts of development. However, it is important to note that outputs are only as valid as the inputs used to create them.

If one component of the map is only accurate to + or – 300 feet, then the overall positional accuracy of the GIS analysis is no better than the sum of the positional errors or in this case + or – 300 feet. The USGS Quad Sheets are rendered at a 1 to 24,000 scale (this is a ratio of 1 map unit to 24,000 ground units). Therefore, if we relate this to 1 map inch to 24,000 ground inches, we have 1 inch equals 2,000 feet. At this scale, the line depicting a pipeline or a pipeline easement could be as wide as a subdivision lot. If you extend a buffer along both sides of the pipeline or pipeline easement that has an accuracy of + or – 300 feet, then you could impact several additional proposed subdivision lots. A ground survey would be required to substantiate the location to a more relevant accuracy (regarding other GIS layers, approximately + or – 10 feet).

Maps are representations of our environment, both natural and man-made. If they do not give us all the detail required or needed, we will secure another source or physically visit the location. In recent years, GIS has provided the public with a variety of map viewers such as; Map Quest, Google Earth and Virtual Earth. Their popularity and use has grown extensively over the past few years whereby many citizens use it as a viable source of geographic data. The relative accuracy of the geographic data depicted on these sites will widely vary. Therefore, there are concerns within the GIS community that the data will be used to draw inappropriate conclusions which could lead to inappropriate actions. Consequently, if we are to use GIS to support planning, policy making and action, then it should be relatively accurate for those purposes. In these cases, good data will promote good planning which will promote pipeline safety.

John O'Looney, Ph.D., in his book "Beyond Maps," states the following:

> "At least 70 to 80 percent of the average local government's work or business processes involves land or ***geographically*** related issues."
>
> "A GIS uses ***geographic location*** to relate otherwise disparate data and provides a systematic way to collect and manage crucial ***location-based*** information."

If we are to successfully manage business of government, we need the appropriate geographic information. Therefore if we intend to input, store, retrieve, manipulate, and analyze layers of geographic data to produce interpretable information, then the geographic data will need to timely, accurate and complete.