BIOGRAPHICAL INFORMATION

David B. Nemeth
Manager – GIS Systems
Operations & Engineering
Panhandle Energy

Specific Responsibilities

Joined Panhandle Eastern Pipeline Company in 1980. Currently responsible for the management of the Panhandle Energy Geographic Information System, which contains over 13,000 miles of large diameter natural gas pipelines. Managing and implementing Panhandles expanding role of GIS in their Engineering and Operations environment to include web access to all mapping and system information, corrosion analysis, risk assessment, pipeline integrity, and many other areas. Panhandle Energy companies include Panhandle Eastern Pipe Line Company, Trunkline Gas Company, Trunkline LNG Company, Sea Robin Pipe Line Company, Southwest Gas Storage Company.

Past Experience

Over the last 23 years, have worked in various positions of increasing responsibility until being promoted to Manager - GIS Systems. Began working with GIS technologies over 13 years ago and has continued to work in this expanding arena. Was appointed as a member of the ISAT (Integrated Spatial Analysis Tools) project design team in 1995 and was involved in the design of the first applications that supported the ISAT model. Lead on the design and implementation team for the implementation of the Duke Energy FRAMME GIS Pipeline System. Currently on the pipeline design team for the GeoDatabase ISAT 3 Model – APDM.

Educational Information

Johnson County Community College
Houston Community College

Professional Memberships

2003 GITA Oil & Gas Conference Chairman
Member of GITA and on the ITAG Committee for GITA's National Conference
Member of the Conference Committee for GITA's Fall Oil & Gas Conference

BIOGRAPHICAL INFORMATION

Fred Spickler
GIS / RS Manager
Photo Science, Inc.

Specific Responsibilities

Mr. Spickler serves as Project Manager for Photo Science's pipeline transmission applications and GIS analysis projects.

Past Experience

Mr. Spickler has over ten years of experience in defining and performing GIS analysis tasks and developing comprehensive GIS applications that include Internet GIS components. Mr. Spickler has been involved in developing large-scale GIS products for the pipeline transmission industry for the past seven years. Additionally, Mr. Spickler has over 12 years of experience working in the Remote Sensing field.

Recent large pipeline transmission GIS applications managed by Mr. Spickler include Photo Science's *ClassWorks* and *HCAWorks* applications. These two stand-alone GIS applications provide DOT Class Area and High Consequence Area (HCA) locations that connect directly to corporate GIS relational databases for a number of pipeline transmission utilities. Mr. Spickler also manages Photo Science's *ClassWorkFlow* and *HCAWorkFlow* applications. These two stand-alone Internet / relational database workflow applications assist pipeline transmission companies in managing and mitigating DOT Class Areas and HCAs for comprehensive DOT regulation 49 CFR Part 192 compliance for these areas. Mr. Spickler also manages Photo Science's RP-1162 Public Awareness Notification programs that are performed regularly for several large pipeline transmission companies.

Educational Information

B.A. – Geology with Remote Sensing and Specialization, Hanover College
M.S. – GIS and Remote Sensing, Murray State University

Professional Memberships

ASPRS, GITA

HCA IDENTIFICATION AND PROCESS WORKFLOW

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ABSTRACT:

This paper will present the criteria for determining High Consequence Areas (HCA) using attributed spatial data and describe how analysis is performed to determine the existence and limits of an HCA. Additionally, the workflow process required to manage an HCA and its accompanying documentation through its lifecycle will be presented. Finally, an Internet work-flow software application that exhibits a real-world solution to managing the HCA lifecycle from discovery to final management action will be illustrated.

INTRODUCTION

In the transmission industry today, many of Americas major gas transmission companies are finding themselves strained in their efforts to meet the deadlines for compliance with the DOT's High Consequence Area Management Rule. Using a case study at Panhandle Energy, this paper provides an introduction to the lifecycle process of a High Consequence Area from its discovery and delineation to its prioritization for threat assessment. The process adopted by Panhandle Energy utilizes attributed spatial data housed in a Relational Database Management Systems (RDBMS) and Geographic Information Systems (GIS). These data and tools, in conjunction with specialized Internet applications, provide a unified, interconnected management system for the HCA lifecycle at Panhandle Energy. From a GIS perspective, the data criteria and analysis methodology for HCA determination will be introduced and the HCA lifecycle management process will be detailed and illustrated via Panhandle Energy's HCA workflow management application.

CRITERIA

The minimum criteria for determining High Consequence Areas (HCA) using attributed spatial data are not complex from a GIS perspective. However the scale in linear miles of the data sets maintained by large gas pipeline transmission companies adds a very significant level of complexity to the criteria. Foremost, the digital data must be spatially referenced. If the entire data set is not referenced to the same coordinate system, a spatial reference management protocol must be followed for efficient update of the data. Additionally, the accuracy parameters for the spatial features should be known such that these accuracies can be factored into HCA calculations. Secondly, data should be attributed consistently and completely for the needed parameters. To assist in achieving this lofty goal, it is recommend that a standardized data model be applied to the data set such that predefined relationships and domains for data values can be utilized.

DATA ANALYSYS AND HCA DETERMINATION

To affectively perform quality control and quality assurance throughout the HCA lifecycle management process, it is necessary to have an understanding of the parameters and calculations utilized to determine an HCA. A complete definition of these calculations and parameters is beyond the scope of this paper. This information can be found in the published DOT 49 CFR Part 192. A simplification of mathematical process will be provided here in order to understand the spatial process for defining HCA limits.

According to the rule, "To define an HCA use the C-FER radius without additional safety margin to define the Potential Impact Circle and extend by one additional radius on either side of the segment that could potentially impact an HCA."* To determine these HCA spatial limits, the GIS moves down each pipe section calculating the proximity of spatial features that represent areas inhabited by humans to the pipeline feature and to themselves. The primary function of the GIS in the HCA discovery phase is to determine the beginning and ending locations of an HCA via spatial analysis of the human inhabited area information and the impact radius that has been determined from calculations applied to each section of the pipe. Once these limits are determined, an additional impact radius is added to each end of the HCA. The final shape, area and location of the HCA are then stored in the database via the GIS. This HCA discovery process is then repeated incrementally throughout the entire pipeline system.

Managed Segments

Once HCA limits have been determined along a pipe section, overlapping HCAs can be combined into single, continuous areas called Managed Segments. Combining overlapping HCAs into Managed Segments helps to simplify the management process as the total number of areas are reduced. Once resolved, the outer limits of each Managed Segment and any associated attribution are then recorded to the spatial database.

* Department of Transportation 49 CFR Part 192

HCA MANAGEMENT

Immediately after HCA limits have been resolved by the GIS, the HCA begins its path through the complex HCA management lifecycle via the HCA Workflow Internet application. The HCA is maintained through the workflow application until it is finally prioritized and scheduled for assessment or is rejected after further analysis determines it to be invalid. In the process of an HCA through the management workflow, the HCA passes through multiple departments within Panhandle energy where personnel research, verify and make mitigation decisions regarding the HCA. If an HCA is completely mitigated during the process workflow, it is returned the GIS process queue and the area is recalculated by the GIS system. If, after the recalculation process, if the HCA still exists, it returns to the beginning of the management process and proceeds again through the workflow.

In the full lifecycle of an HCA, it can pass through some or all of the HCA personnel groups and may pass though some groups multiple times before finally ending its lifecycle. To alert group members that an HCA has arrived at their phase of the workflow, email notifications are automatically sent to the group members. These emails contain a message about the HCA and a hyperlink that allows the group member to jump directly to the HCA record in the workflow application. Within Panhandle Energy, these groups include the: GIS Group, Central Pipeline Integrity Group, Division Pipeline Integrity Group, Area Supervision Group, Director of pipeline Integrity, HCA Committee, Gas Control Group, and the Right-of-Way Group.

At each phase of the lifecycle workflow, all decisions, recommendations and pertinent information provided by the personnel group are attached to the HCA. This enables each step along the process to be fully and automatically documented. This documentation travels with the HCA and is accessible at all times throughout the workflow. In the event of a discrepancy, this information can be used to trace back through each phase of the workflow such that the source of the problem can be easily found and rectified.

HCA LIFECYCLE WORKFLOW APPLICATION

Illustrations from the *HCAWorkFlow* application of HCAs at various stages of the workflow are provided below.

CONCLUSION

In the effort to efficiently discover and manage HCAs over a large pipeline system, the use of an HCA lifecycle management system is an invaluable tool. The system affectively organizes a large number of HCAs into a comprehensive managed process that allows users from distant locations to contribute to the HCAs lifecycle. The HCA lifecycle managements system prevents errant data the can cause the creation of invalid HCAs from being discovered at the end of the process in the costly mitigation phase and prevents valid HCAs from becoming lost, disorganized, or misrepresented.