Utilizing GIS to Effectively Manage Pipeline Regulatory Requirements

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Points of Discussion

• Common hurdles of regulatory requirements

• Advantages of Utilizing GIS to manage pipeline integrity and emergency response

• Case Studies Examples
Regulatory Requirements
Regulatory Requirements

• The office of Pipeline Safety ensures safety in the design, construction, operation, maintenance, and spill response planning of America’s 2.6 million miles of natural gas and hazardous liquid transportation pipelines.

• The Environmental Protection Agency (EPA) has primary responsibility for enforcing many of the environmental statutes and regulations of the United States.
Regulatory Requirements

• In recent years, provisions have been added for new leak detection methods.

• The standards have also been amended to include processes for managing safety, such as the use of integrity management programs.

• Regulators ensure companies are complying with requirements through measures such as inspections, audits, and investigations.
Regulatory Hurdles

Pipeline companies are responsible for:

- Following strict rules detailing how pipelines are built, operated, and even retired
- Due diligence for pipeline integrity management
- Timely reporting
Regulatory Hurdles

Consequences for not complying with regulatory requirements:
- Drop in pipeline pressure rates, reducing capacity
- Monetary fines
- Pipeline shut down order

Common hurdles associated with pipeline regulations:
- Takes a significant amount of time to manually gather info
- Resources required to analyze and report findings
Advantages of GIS and Case Studies
Advantages of GIS for... Administration of Integrity Management Programs

◦ Preparing the integrity dig program
◦ Knowing the exact location of the anomaly
◦ Determining land ownership details
  ◦ Who owns the land where the dig is required?
◦ Reduce environmental impacts to the land
◦ Overlay previous integrity data to understand the progression of anomaly
Case Study Example: Integrity Management Program

Utilize ArcGIS to create a dig program
- Provide a list of all landowners that need to be contacted
- Provide the coordinates of the dig site within <1 meter of the anomaly
- Analyze the rate of progression of anomalies on the pipeline over multiple ILI runs

Benefits
- Reduced costs
- Lower lease access payments, dig costs reduced, reduced dig crew costs
- Less environmental impact to land
Case Study Example: Integrity Management Program

Utilize ArcGIS to create an alignment sheet

- Show landowner details in and around the area of the proposed dig site
- Easily see the pipeline attribute data in the proposed dig site
- Better understand the elevation and ground cover of the area
Advantages of GIS for:

Field Development Planning

◦ Where are the environmentally sensitive areas?
◦ Is there existing infrastructure?
◦ What preventative measures can be taken to reduce environmental impact?
◦ Utilizing GIS for field development planning will give you results within days or hours after implementation!
◦ Variability on project and scenario definitions
◦ Data management, analysis tools, reporting and visualization tools necessary for managing repeatable settings and outputs
Case Study Example: Field Development Planning

Design your Workflow

- Field Development planning needs to be designed around a core suite of capabilities
- Configurable based on modeling requirements
- Flexibility for specific settings
- Ability to be embedded in your proprietary processes or products
Case Study Example: Field Development Planning

Producing your results...

- Optimal locations of assets and facilities
- Locations may be sited based on standard optimization or temporal analysis
- Placement based on a backcast or forecast approach
- Planning process provides results that maximize the power produced while reducing environmental and visual impact, construction costs, and time
Case Study Example:
Field Development Planning

Placement of assets may vary based on the approach...

**FORECAST**
- Generally based on close range outlooks on production to plan pipeline network
- Pipeline network designed and installed for first few wells
- More wells planned, more pipelines designed and installed
- Pipeline network utilizes the existing network where possible for tie-ins
- New wells sites are daisy-chained to existing sites and pipelines
- Each year’s plan is optimized but not the overall pipeline network

**BACKCAST**
- Future desired state is envisioned and steps to attain defined from future to present
- Entirety of the pipeline network is planned based on a future state
- It is understood that a plan may need to change – this is a good use of contingency
- Prize is large for companies that can plan and execute
Case Study Example: Field Development Planning

FORECAST

This example takes the following into account...

- Planned Well Pads Per Year
- Sited Pipelines Per Year
Case Study Example: Field Development Planning

This example takes the following into account...

- Well Pads planned by Year 4 as well as the associated pipeline gathering system
- Plan the network with the overall network in mind
Case Study Example: Field Development Planning
# Case Study Example: Field Development Planning

## Comparison for Field Expansion

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<th>Backcast (mi)</th>
<th>Actual (mi)</th>
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<td>2.3</td>
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Advantages of GIS for:

Fate and Transport Modeling
- What is the worst case scenario if a release were to happen?
- What are the High Consequence Area (HCA) impacts?
- What preventative measures can be taken to reduce impact?
Case Study Example: Fate and Transport Modeling

What is Overland Flow?
- Prediction of the movement, extent, and time taken for an uncontrolled release (from a pipeline) to travel over the ground surface, seep into the soil matrix, and reach conduits for transport.

Overland Flow Models can be used in support of:
- High Consequence Area (HCA) Analysis
- Emergency Response Planning (Control Points)
- Valve Placement/Configuration
- Pipeline Risk Assessment
- Public Awareness and Consultation
Case Study Example:
Fate and Transport Modeling
Case Study Example: Fate and Transport Modeling

Fundamental parameters required for modeling overland spills include:

- Terrain/Topography
- Drainage Systems (natural and/or man-made)
- Fluid Properties
- Operating Condition
- Potential Release Volume
- Emergency Response Time
Case Study Example: Fate and Transport Modeling
Advantages of GIS for:

**Emergency Preparedness and Response**

- What is around the area of the emergency?
- Evacuation requirements
- Is there a community shared services group that can be mobilized?
- Where are the safety zones?
- What did the area look like prior to the incident?
Case Study Example: Emergency Preparedness and Response

What is your approach to addressing these scenarios?

- High Consequence Area (HCA) determination supports the assessment and reporting of both directly and indirectly affected HCAs within simple or complex analysis areas.

- Define an analysis area by utilizing a selected offset distances field or a complicated pre-defined polygonal geometry.
Case Study Example: Emergency Preparedness and Response
Control Points

Case Study Example:
Emergency Preparedness and Response
Case Study Example: Emergency Preparedness and Response
Questions?
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