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Gaining Insight*

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Inventorying Directly and Indirectly Affected High Consequence Areas

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February 13 - 16, 2005

Presentation Outline

- ▶ Introduction
 - What is a HCA
 - United States Regulatory Requirements
- ▶ Directly Affected HCAs
 - Data Sources
 - Analysis Process
- ▶ Indirectly Affected HCAs
 - Data Sources
 - Modeling Parameters
 - Analysis Process
- ▶ Management of Analysis Results



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Introduction

What is a HCA?

- ▶ Areas of concern in close proximity to a pipeline
 - Population density
 - ▶ High and other population areas
 - Environment
 - ▶ Drinking water sources, ecological sensitive areas, national fish hatcheries
 - Cultural (still under development)
 - ▶ National parks, cultural resources, recreational resources, tribal resources
 - Economic
 - ▶ Commercially navigable waterways and other economic resources



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Introduction

Department of Transportation Regulations

- ▶ Pipeline Integrity Management in High Consequence Areas 49 CFR 195.452
 - Applies to hazardous liquid pipeline and carbon dioxide pipelines that could affect a HCA
 - Written integrity management program that includes
 - ▶ Risk on each segment of pipeline
 - ▶ Baseline assessments
 - ▶ Evaluation of consequences of a failure on the HCA
 - ▶ Process for identifying which pipeline segments could affect a HCA



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Introduction

- Written integrity management program that includes (cont.)
 - Risk Analysis
 - Criteria includes but not limited to:
 - » Terrain surrounding the pipeline segment
 - » Elevation profile
 - » Product characteristics
 - » Volume of product release
 - » Crossings and transportation
 - » Operating pressures



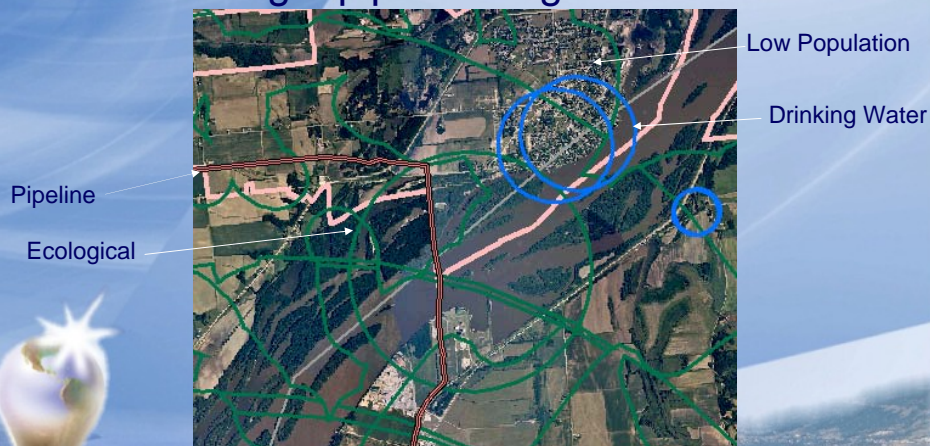
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Directly Affected HCAs

- Intersecting a pipeline alignment



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Directly Affected HCAs

Data Sources

- Location of pipeline alignment

Longitude	Latitude	Stationing
-83.93126941	41.71883625	0
-83.80372952	41.81159739	48505
-83.80175773	41.81089048	49102
-83.8014898	41.81122716	49245
-83.8005504	41.81106786	49508
-83.78673945	41.81111731	53279
-83.78491282	41.81116111	53778
-83.77607121	41.81026854	56214
-83.76660634	41.80911244	58632
-83.75556699	41.80753939	61901
-83.7541511	41.80736897	62292
-83.74877115	41.80747978	63758

Typically derived from survey data

Available through In-line inspection data

VPM Distance	Type	Sub Type	U/S Active Joint	Weld Offset	Client Joint	Source	Source Name	Source Distance	Joint	Max Depth	Avg Depth
1483.644	Weld		3000	0		ILI	2002 PI MFL GE	1265.347		38000	
1530.824	Weld		39000	0		ILI	2002 PI MFL GE	1307.534		35000	
1562.931	Metal Loss Detect		28000	31.885		ILI	2002 PI MFL GE	1338.219		35000	11
1578.178	Weld		40000	0		ILI	2002 PI MFL GE	1354.361		40000	
1591.103	Metal Loss Detect		40000	12.635		ILI	2002 PI MFL GE	1367.196		40000	12
1641.450	Weld		41000	0		ILI	2002 PI MFL GE	1417.235		41000	
1704.745	Weld		42000	0		ILI	2002 PI MFL GE	1480.053		42000	
1769.051	Weld		43000	0		ILI	2002 PI MFL GE	1542.32		43000	
1831.088	Weld		44000	0		ILI	2002 PI MFL GE	1605.521		44000	
1893.541	Weld		45000	0		ILI	2002 PI MFL GE	1667.542		45000	
1956.766	Weld		46000	0		ILI	2002 PI MFL GE	1730.33		46000	
2020.000	Weld		47000	0		ILI	2002 PI MFL GE	1793.126		47000	
2083.186	Weld		48000	0		ILI	2002 PI MFL GE	1855.875		48000	
2128.717	Metal Loss Detect		48000	46.209		ILI	2002 PI MFL GE	1862.084		48000	13
2146.475	Weld		49000	0		ILI	2002 PI MFL GE	1919.725		49000	
2190.282	Utility Crossing	Pipeline				StrPt	PDGS	2031			

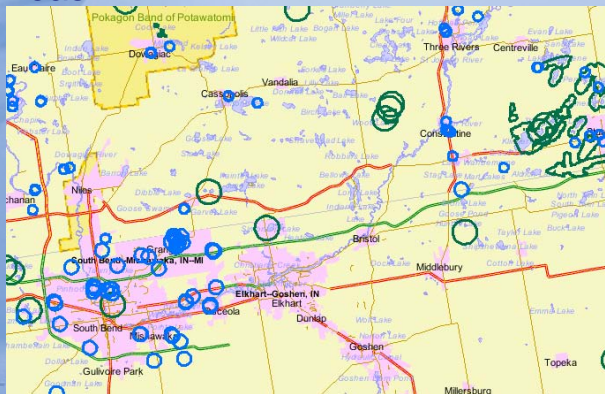


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Directly Affected HCAs

Data Sources

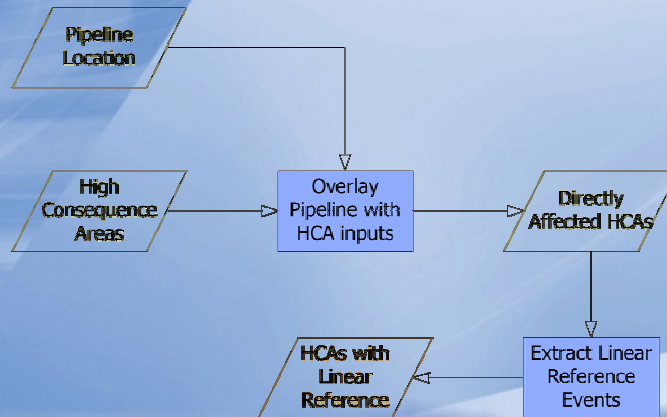
- Composite of all High Consequence Areas



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Directly Affected HCAs

▶ Analysis Process

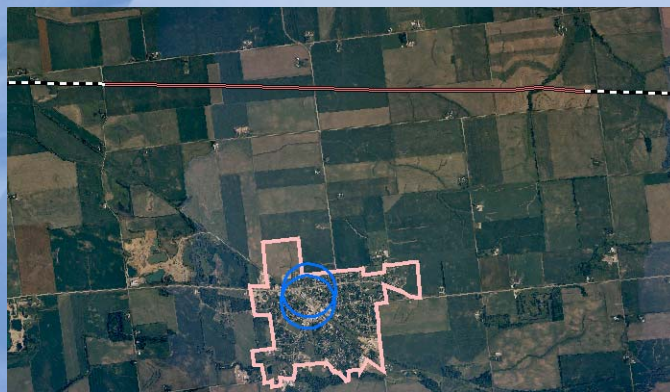


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Indirectly Affected HCAs

▶ More rigor required to determine HCA



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Indirectly Affected HCAs

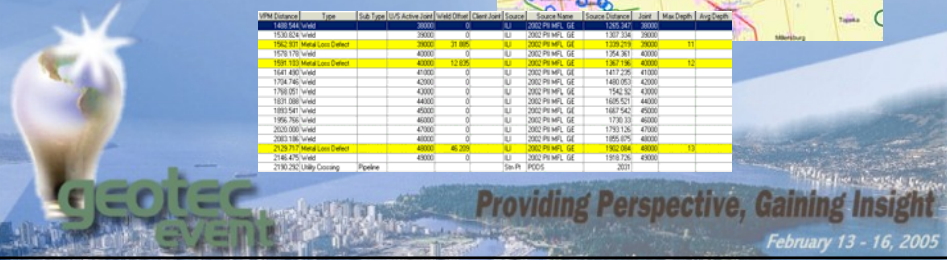
Data Sources

- Location of pipeline alignment
- Composite of all High Consequence Areas

Longitude	Latitude	Stationing
-03.93126941	41.71003625	0
-03.00372952	41.01159739	49505
-03.00175773	41.01099040	49102
-03.00140580	41.01122716	49245
-03.0005504	41.01106706	49500
-03.70673945	41.01111731	53279
-03.70491262	41.01116111	53770
-03.77607121	41.01026654	56214
-03.76660034	41.00911244	56032
-03.75556699	41.00753939	61901
-03.75415111	41.00736897	62292
-03.74077115	41.00747970	63750



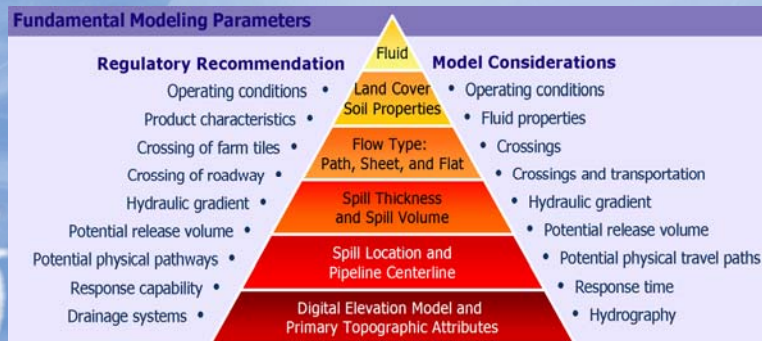
WPM Distance	Type	Sub-Type	IS Active	Used Other	Clear Dist	Source	Source Name	Source Distance	Unit	Min Depth	Max Depth
1480.544	Wired		0	0	0	3002	PR MFL GE	1209.341	30000		
1520.036	Wired		0	0	0	3002	PR MFL GE	820.326	26000		
1562.971	Manal Loss Defect		0	0	0	3002	PR MFL GE	1339.219	30000	11	
1576.176	Wired		0	0	0	3002	PR MFL GE	1354.361	40000		
1601.103	Manal Loss Defect		0	0	0	3002	PR MFL GE	1361.196	40000	12	
1647.400	Wired		0	0	0	3002	PR MFL GE	1417.225	41000		
1752.706	Wired		0	0	0	3002	PR MFL GE	1480.003	42000		
1760.051	Wired		0	0	0	3002	PR MFL GE	1542.92	42000		
1831.088	Wired		0	0	0	3002	PR MFL GE	1626.521	44000		
1883.541	Wired		0	0	0	3002	PR MFL GE	1683.742	45000		
1966.706	Wired		0	0	0	3002	PR MFL GE	1730.33	46000		
2020.000	Wired		0	0	0	3002	PR MFL GE	1792.125	47000		
2083.138	Wired		0	0	0	3002	PR MFL GE	1859.025	48000		
2143.877	Manal Loss Defect		0	0	0	3002	PR MFL GE	1922.084	48000	13	
2146.475	Wired		0	0	0	3002	PR MFL GE	1959.226	49000		
2190.292	Utility Crossing	Pipeline	0	0	0	100	PR P005			2017	



Indirectly Affected HCAs

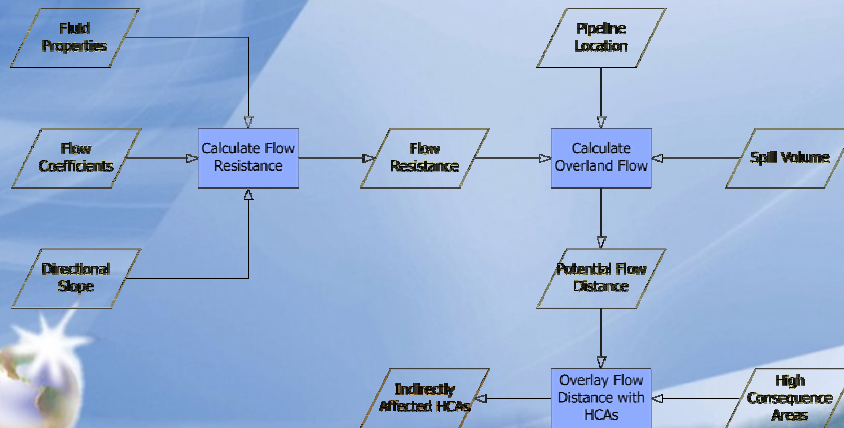
Data Sources

- Series of data inputs used to delineate the overland flow



Indirectly Affected HCAs

▸ Analysis Process



Management of Analysis Results

- Auto-population of HCA database table
- Integrating the analysis and analysis output with a relational database
- Perform audit queries
- Run reports
- Re-use within the geographic information system
- Triggers can then be activated to automatically prompt action for remedial activity.



Conclusions

- ▶ Regulatory requirements need to be addressed with an effective tool
- ▶ HCA analysis must be comprehensive, repeatable and defensible



References

- ▶ US Department of Transportation
(http://www.access.gpo.gov/nara/cfr/waisidx_03/49cfr195_03.html)
- ▶ Integrated Informatics
(“Overland Flow: Comparison of Modeling Methods”, September 2004)

